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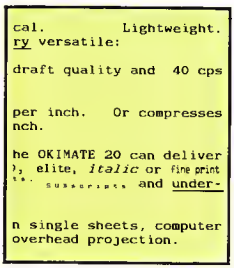

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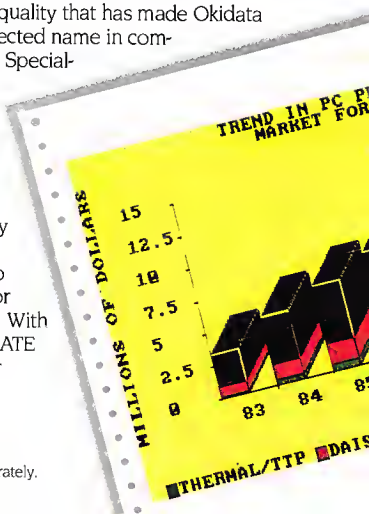

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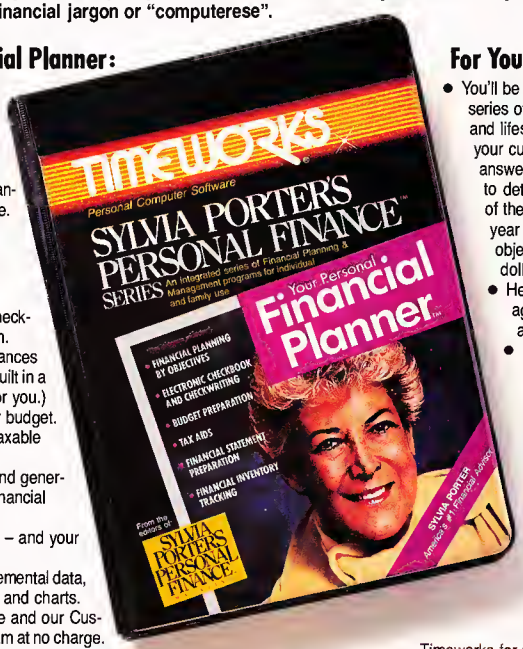

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July 1985
Vol. 7, No. 7

FEATURES

REVIEWS

COLUMNS AND DEPARTMENTS

THE JOURNAL

NOTE: See page 93 before lyping in programs.

AP Apple, **Mac** Mocintosh, **AT** Atori, **V** VIC-20, **64** Commodore 64, **+4** Commodore Plus/4, **16** Commodore 16, **P** PET/CBM, **TI** Texas Instruments, **PC** IBM PC, **PCjr** IBM PCjr, **CC** Rodio Shock Color Computer, *General Interest.

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Editors Notes

We visited Amiga in California a few weeks ago, and it was reminiscent of those 60 *Minutes* or 20/20 shows where Mike Wallace or Geraldo Rivera pop up in somebody's office with a camera crew and are blockaded in the lobby by uneasy receptionists.

In early May, I and two other editors were in San Francisco visiting some hardware and software companies in Silicon Valley. Since we were near Los Gatos, where Commodore/Amiga is based, we decided to drop by for an impromptu visit. Amiga, you'll recall, is the recently acquired Commodore subsidiary which is putting finishing touches on the Lorraine computer that we saw in rough prototype form at last summer's Consumer Electronics Show (COMPUTE!, August 1984). We heard it would be ready for introduction by midsummer, so we figured it was about time for our customary firsthand look.

We had high hopes when we happened to encounter Amiga Founder/President David Morse in the parking lot. But Morse was in a hurry to go somewhere in his car; he said he wouldn't be back all day. Another person we wanted to talk to was out of town, he said. Disappointed, we asked Morse to recommend someone else. Morse gave us a name and then quickly drove away.

In the lobby, the receptionist summoned the woman to whom Morse had referred us. When we identified ourselves, the woman appeared quite flustered. "What is your goal here?" she asked nervously. We said we were interested in some information on the Lorraine.

"We aren't saying anything publicly at this point," she told us. "We aren't saying anything at all."

We explained that our deadlines made it impossible for us to publish a substantial article until at least the August issue anyway, and that we'd even be happy to sign a nondisclosure agreement promising not to leak any secrets to competitors.

"We just can't say anything. In fact," she added, "I don't even *know* anything."

We asked if we could talk to anyone else. She said perhaps the general manager would speak to us. She left to find him, but returned five minutes later and said he wasn't around. "Maybe you can go out for lunch and call back in an hour or so and see if anyone is available," she suggested.

We already knew what the answer would be, but we agreed to leave and call back anyway. Sure enough, when we phoned an hour later, nobody was available to talk to us. We drove back to San Francisco.

The New Atari

Fortunately, we had much better luck at Atari headquarters in nearby Sunnyvale. Not only did we get to work with a new 520ST all day, we also were guided on a tour of Atari's development labs by Sam Tramiel, president, and his brother, Leonard. (Their father, Jack Tramiel, was at a trade show in Atlanta.)

From what we saw, the ST is everything that was promised at Winter CES—except on time. It was promised for April, but apparently won't be available in quantity in the U.S. until summer (although Europe is getting some shipments earlier). Still, the delay is understandable, considering what it takes to get a computer like the ST into production and onto the store shelves. And it looks like it *will* be well worth the wait.

The production-model 520ST is basically the same as the prototype unveiled in January except for one major change: The operating system (OS), GEM, and programming language will be loaded into RAM from disk rather than built into ROM, at least at first. This leaves only about 240K RAM free, out of the total 512K. (Because of this and rapidly decreasing RAM chip prices, Atari won't manufacture the previously announced 128K 130ST.) Evidently Atari is making so many last-minute changes that they don't want to lock themselves into ROM at this time. Atari says the OS will end up in ROM eventually, but there may be no easy way for early owners to make the upgrade.

The 520ST will be available in a package that includes the operating system disks, microfloppy disk drive, and hi-res monochrome monitor for $799. The drive is very impressive—it stores 1/2 megabyte (about 381K formatted) per disk and is the fastest floppy we've ever seen. In fact, it appears to be faster than *hard disks* on the Macintosh. The monitor, too, is stunning. It refreshes the screen at 70 hertz instead of the usual 60 hertz, displaying a super-sharp image that looks like a sheet of paper with crisp lettering. Nor is Atari ignoring the software—look for a BASIC interpreter/compiler, Logo, Forth, Pascal, C compiler, 68000 assembler, *Lotus 1-2-3* compatible spreadsheet, and a major database manager to be released soon after the ST debuts.

We also learned that Atari still plans to sell a 10 megabyte hard disk for under $500 by fall, and a CD-ROM peripheral by the end of the year. The CD-ROM is a read-only storage device that can instantly access about 550 megabytes on a single Compact Disc, enough for a whole encyclopedia (hint). Atari says it will cost under $500 and will also double as a CD player for your stereo.

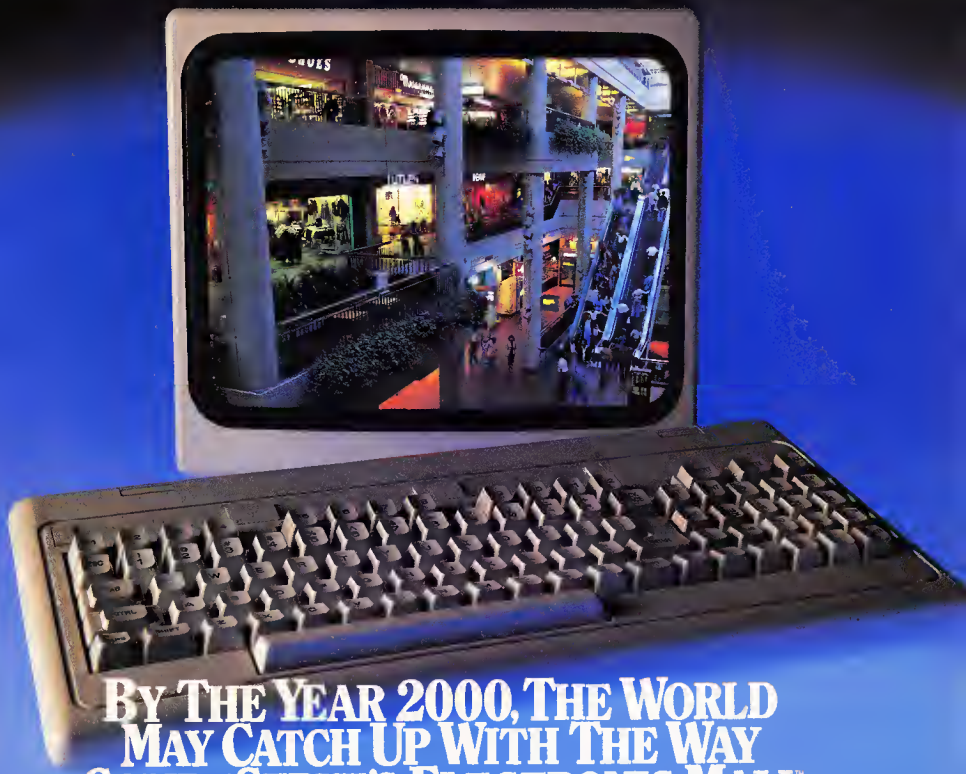
As if all that weren't enough, we got a glimpse of yet another goody in the lab—a prototype of Atari's full 32-bit computer, the desktop machine that's supposed to be as powerful as a VAX minicomputer. It uses a National Semiconductor 32000-series CPU and is targeted for under $5,000...maybe a lot under $5,000.

Tom R. Halfhill, Editor

Editors' Note: In defense of the employees of Amiga/Commodore, we must point out that another perspective might suggest that two unidentified persons appeared in the Amiga parking lot as David Morse was driving away on an errand.

After they claimed to be the editor and program editor from COMPUTE!, he sent them inside and continued on his errand. Once inside, other Amiga employees quite rightfully told these COMPUTE! zealots that they were not allowed to talk to them. Frankly guys, it was a nice try. The story would have been ever so much better had it worked. Perhaps we'd better stick to personal computing and leave these "hard-hitting investigative sorties" to Mike Wallace and Geraldo Rivera.

—RM & RCL



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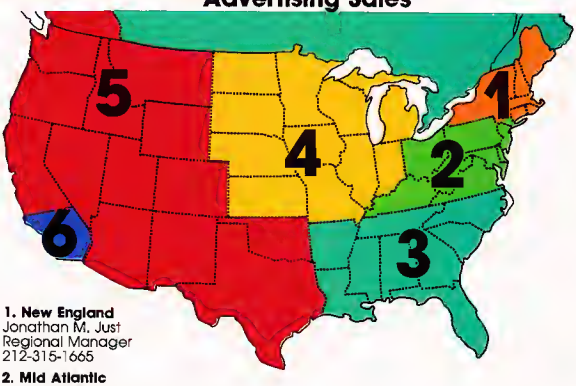

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The Editors and Readers of COMPUTE!

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TurboDisk Translations?

I enjoy your magazine tremendously, especially utility programs such as "TurboTape" [COMPUTE!, January 1985] and "TurboDisk" [COMPUTE!, April 1985]. However, I am a proud Atari user. In the past you have published some interesting and useful programs for Atari, but never something as valuable as the Commodore programs you have published in the last few issues. I hope you will consider printing similar programs for Atari and other computers very soon.

Duyen Nguyen

A number of readers have asked us to translate these programs for other computers, or publish other "breakthrough" programs for their machines. Needless to say, we're as anxious to publish programs of that quality as you are to see them.

What you might not realize is that most of the programs we publish are submitted by readers like yourself. Our Submissions Reviewer has a full-time job testing and evaluating the several hundred programs we receive every month. Very few submitted programs are as extraordinary as the two you mention. But we're always on the lookout, and you can be sure that we'll publish anything of similar quality as soon as it comes in the door.

When a program is particularly good with broad appeal, we do provide translations for other popular computers. For example, the Commodore 64 version of the SpeedScript *3.0 word processor was adapted for the VIC-20 (April 1985), Atari (May 1985), and Apple II series (June 1985). These are among the best programs we've ever published for those machines. Adapting a large, complex machine language program like* SpeedScript *is far from easy and requires several months of work, but it's possible because word processing is something any computer can do: Every computer can store characters in memory, receive input from the keyboard, and so on.*

Programs such as "TurboTape" and "TurboDisk," on the other hand, are highly machine-specific: *They exploit hardware features unique to the Commodore 64, VIC-20, and 1541 disk drive. Making such programs work on other machines may be technically impossible, or at least require entirely different techniques. But our readers have a habit of surprising us. Perhaps there's someone out there working on Atari TurboDisk or TurboTape right now.*

Hints For ON-GOTO

I want to commend you on promoting the ON-GOTO/ON-GOSUB commands ["The Beginner's Page," COMPUTE!, March 1985], but I think you missed the best (most useful) aspect of them—the ability to perform math functions within the line. In your example program, I would have preferred to see ON A−4 GOTO *linenumber* instead of A=A−4:ON A GOTO *linenumber*. My method preserves the value of A and saves a line of code.

I keep a stat file for our church softball team on a menu-driven program I wrote. I've used ON-GOSUB with the function keys on my Commodore 64 to greatly simplify coding [see below]. The function keys have ASCII values from 133 to 140 in the order listed in my program (f1, f3, f5, f7, f2, f4, f6, f8), so ASC(F$)−132 gives me nice neat numbers from 1 to 8.

Matthew Strange

You're absolutely right, of course—it is indeed more efficient to convert a value for ON-GOTO/ON-GOSUB within the line itself, rather than making it a separate line. As you point out, it saves a little memory and preserves the original value, which may be important in some cases.

In general, the programming examples in "The Beginner's Page" are written more for clarity than for maximum efficiency. For that reason, and also to keep the examples compatible with all the computers we cover, each statement is usually placed on a separate line. (For instance, the built-in BASIC on the TI-99/4A allows neither multistatement lines nor any command following an IF-THEN except GOTO linenumber.*) Readers are encouraged to experiment with the examples and find ways to optimize them for their particular computer and version of BASIC.*

Your method of reading the Commodore 64 function keys is efficient and can be adapted to reading keys and joysticks on a variety of computers. As a module, it can be plugged into any program that prompts a user to select a menu option:

```
10 PRINT "PRESS F1 TO VIEW STA
   TS"
20 PRINT "PRESS F3 TO UPDATE S
   TATS"
30 PRINT "PRESS F5 TO SAVE STA
   TS"
40 PRINT "PRESS F7 TO PRINT ST
   ATS"
50 PRINT "PRESS F2 TO ENTER NE
   W PLAYERS"
60 PRINT "PRESS F4 TO CREATE N
   EW TEAM FILE"
70 PRINT "PRESS F6 TO VIEW FIL
   E NAMES"
80 PRINT "PRESS F8 TO CORRECT
   {SPACE}ENTRY"
90 PRINT "PRESS Q TO QUIT"
100 WAIT 198,1:GET F$:IF F$="Q
    " THEN END
110 IF ASC(F$)<133 OR ASC(F$)>
    140 THEN GOTO 100
120 ON ASC(F$)-132 GOSUB 2000,
    3000,1000,3500,2500,9500,5
    300,4000
```

(This program fragment assumes that subroutines will be added at the line numbers specified in the ON-GOSUB state-

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ment in line 120, so if you run the program as listed and press a function key, you'll get an error.)

The program employs a couple of other useful techniques, such as waiting for a keystroke (line 100), trapping invalid input (line 110), and extracting numeric values from string variables (lines 110 and 120). The main point is line 120, which neatly converts the value returned by the function key into a value that can be acted on by ON-GOSUB. At the same time, it preserves the original value returned in F$. It's a clever way to organize a menu while avoiding confusion over the staggered numbering of the Commodore 64 function keys.

Incidentally, if you're the statistician for your church softball team, see "Softball Statistics" elsewhere in this issue. You may want to include some of its features in your own program.

Atari Translator Disk

I would like to know if it's true that some software will not run on the XL computers unless you load a special program first. Do I have to buy this program or is it available for publication? If I have to buy it, does it come on both cassette and disk?

Randall E. Nowak

The program you're looking for is the Atari Translator Disk, *available from Atari and some local user groups for a nominal fee. The part number is DX-5063. The* Translator *loads the old Atari 400/800 operating system into RAM on the 800XL or 600XL (with 64K), temporarily replacing the XL operating system. With the* Translator, *your XL computer can run most programs which were not written to comply with Atari's published guidelines for upgrade compatibility.*

A few independent software companies also sell XL translator disks which advertise more flexibility than the Atari Translator.

Computer Vocabulary

I want to write a BASIC text adventure game for my IBM PC. How can I give my program a "vocabulary" so that it understands dozens of words, without using IF statements to check for every word, in every room of the game?

Bill Grau

You're correct—an adventure program that tests for every condition with individual IF statements would be woefully inefficient. To answer the second part of your question first, you'll want to structure your program in modular, rather than linear fashion. While it seems straightforward to write a separate routine for each room in the adventure, this is highly duplicative and will make your program as difficult to debug as most adventures are to play. Instead, use general subroutines that perform the same task no matter where the player is. You need only one routine to analyze the player's input, simulate movement, handle objects, and so on.

The best way to create a vocabulary in BASIC is with arrays. *Unlike a simple variable which equates to a single numeric value (A=1) or string of characters (A$="HELLO"), an array is a* group *of related data items. The short example program below (written in plain-vanilla Microsoft BASIC) creates a rudimentary vocabulary with string arrays.*

```
100 DIM VB$(4),OB$(4):FOR J=1
    TO 4:READ A$,B$
110 VB$(J)=A$:OB$(J)=B$:NEXT
    J
120 DATA TAKE, GOLD, PUT, SWO
    RD, EAT, FOOD, THROW, ROC
    K
130 SP=0:I$="":VB$="":OB$="":
    PRINT "YOUR COMMAND";
140 INPUT I$:FOR J=1 TO LEN(I
    $):T$=MID$(I$,J,1)
150 IF T$=CHR$(32) THEN SP=1:
    GOTO 180
160 IF SP=1 THEN OB$=OB$+T$
170 IF SP=0 THEN VB$=VB$+T$
180 NEXT J:VB=0:FOR J=1 TO 4
190 IF VB$=VB$(J) THEN VB=J
200 NEXT J
210 IF VB=0 THEN PRINT "DON'T
     UNDERSTAND ";VB$: GOTO 1
    30
220 OB=0:FOR J=1 TO 4:IF OB$=
    OB$(J) THEN OB=J
230 NEXT J
240 IF OB=0 THEN PRINT "DON'T
     UNDERSTAND ";OB$: GOTO 1
    30
250 PRINT "VERB #";VB;", OBJE
    CT #";OB:GOTO 130
```

Lines 100–120 store the vocabulary in two string arrays. The array named VB$() holds four verb strings (TAKE, PUT, EAT, and THROW) and the OB$() array holds four object strings (GOLD, SWORD, FOOD, and ROCK).

Once the arrays are set up, each word can be referenced by the index number *that identifies its position within the array. For instance, in response to the statement PRINT V$(1), the computer prints TAKE. The statement IF A$=OB$(1) is true when A$ equals GOLD, and so on. Since the vocabulary has been reduced to reference numbers, you can cycle through the arrays with simple FOR-NEXT loops, testing whether your input words match anything in the vocabulary. This is far more efficient than using a multitude of IF statements.*

Lines 140–180 bring the input sentence into the computer as one string (I$) and break it into two parts: the verb string V$ and the object string O$. Note that simple (nonarray) variables like V$ and O$ are distinct from array variables like V$() and O$(). (Because of space limitations, the program uses a primitive method to extract verb and object from the input sentence: It looks for the space character that separates the words, assigning every character before the space to V$, and everything after it to O$.)

Once the verb and object have been extracted, lines 180–200 compare the verb string V$ to every verb in the vocabulary array V$(). The variable V signifies the verb number. As soon as V$ matches up with a word in V$(), V records the V$() index number for future reference. If V$ isn't found in the vocabulary, line 210 prints the unknown word and lets the player try again. A similar loop in lines 220–230 compares the object string O$ to each word in the O$() array, and records the object number in the variable O.

Using arrays makes your program far easier to modify. For instance, say that you've written an adventure using dozens (or more likely, hundreds) of separate IF statements, and then decide to change one of the vocabulary words. It could take hours to locate and change every line that uses that word. If your vocabulary is stored in arrays, you can make the same change in seconds, by replacing one word in a DATA statement. To expand the vocabulary, just add more DATA items and increase the values in the DIM statement and FOR-NEXT loops accordingly.

Of course, there's much, much more to writing a playable adventure. But arrays can help there, too. Use a room description *array to store the description strings for each room, and a* room connection *array to show the connections between them. The location of each object can be stored in an* object location *array, and so on. You'll want a more sophisticated* parsing *routine as well, to pick apart the input sentence. These techniques and others are explained in* COMPUTE!'s Guide to Adventure Games *by Gary McGath.*

Commodore Chips, Anyone?

We are a group of about 200 Commodore owners in Sao Paulo, Brazil. Because of import restrictions and the great distance involved, we are not able to send Commodore products to the United States for servicing. Some minor repairs, like aligning the 1541 disk drive, we manage to do here. But we have not been able to find anyone who sells microprocessor, interface, or PLA chips. On a recent visit to New York City, I inquired of several dealers, but they could not help us.

Alberto Dayan
Rua Albuquerque-Lins 867 Apt. 1401
Sao Paulo, 01230 S.P.
Brazil

Every once in a while, our mailbag contains both an excellent question and an excellent answer (see the following letter). Unlike most other computer companies, Commodore manufactures its own chips; in 1976 it acquired MOS Technologies (which invented the 6502 microprocessor), and it still manufactures the 6510 micro-

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processor, SID chip, and other major components for the Commodore 64.

Commodore has traditionally shown little interest in making its own chips available to individuals. One reason for this is undoubtedly economics: Commodore is in the business of selling computers, not electronic parts, and has little or no economic incentive to market chips at the retail level.

By the time you read this, however, the chip famine may be ending. According to a company representative, Commodore intends to let its new network of service centers provide repair parts directly to consumers. Of course, it's hard to predict exactly when this will become a reality. In any case, once the national service network is established, Commodore plans to abolish its exchange program. You will no longer be able to replace damaged Commodore products by sending them back to the factory with a check.

Commodore Repair Parts

After you published my address in COMPUTE! (December 1984), I got a great deal of mail from readers with repair problems. I now have a supplier for all Commodore parts, including chips. If anyone has difficulty getting a part, I can help. I also welcome questions on repairs.

Steve Fogolini
8232 Richard Street
Fort Worth, TX 76108

Thank you for the information.

Atari String Handling

I recently heard that the Atari 600XL computer's built-in BASIC doesn't use string arrays. Does this mean that it won't accept programs that use string arrays from the other Atari computers?

Scott Powers

There's nothing to worry about. The BASIC built into the 600XL and 800XL (and new 65XE/130XE) is fully compatible with earlier Atari BASICs. The information you heard about string arrays refers to Atari BASIC in general. True string arrays work like numeric arrays, where each element is a complete string consisting of one or more characters. For example, the statement A$(10)="HELLO" would assign the complete string "HELLO" to the tenth element of the string array A$. In Atari BASIC, however, this statement places the string "HELLO" into the tenth position of the string A$.

*Versions of BASIC that support string arrays cannot use the convenient Atari method of substringing, such as A$(5,5) to access the fifth character of A$, but use functions like MID$(A$,5,1) instead. The Atari can simulate string arrays with substrings. A long string can hold many substrings. For example, to convert the statement A$(5)="CAT", assuming you limit the length of each substring to ten characters, you can use the statement A$(5*10-9,5*10)="CAT". Since the length of an Atari string is limited only by the amount of free memory, you can store a great number of substrings within one long string.*

If you prefer a BASIC with true string arrays, alternative BASICs (including Microsoft BASIC) are available on cartridge and disk for Atari computers.

Hex/Decimal Conversion

Is there a simple formula for converting hexadecimal numbers to decimal, and vice versa? The manual for my computer (an Apple clone) doesn't explain this in much detail.

Howard Heapy

Here's a short Microsoft BASIC program that does both conversions within the range of hexadecimal $0–$FFFF (decimal 0–65,535). When converting from hex to decimal, enter a four-digit hex number, using leading zeros when appropriate. For instance, enter 00FF to find the decimal equivalent of hexadecimal $FF.

```
10 HE$="0123456789ABCDEF"
20 PRINT "ENTER 1 FOR DEC TO
   HEX"
30 PRINT"ENTER 2 FOR HEX TO D
   EC";:INPUT A
40 IF A=2 THEN 100
50 IF A<>1 THEN 20
60 PRINT "ENTER DEC #";:INPUT
    A:B=1:C=3:D=16^C:PRINT A;
   :PRINT "= $";:A=A+1
70 IF A-D>0 THEN A=A-D:B=B+1:
   GOTO 70
80 PRINT MID$(HE$,B,1);:B=1:C
   =C-1:D=16^C:IF C>-1 THEN 7
   0
90 PRINT:PRINT:GOTO 20
100 PRINT "ENTER HEX #";:INPU
    T H$:D=0:Q=3
110 FOR M=1 TO 4:FOR W=0 TO 1
    5
120 IF MID$(H$,M,1)=MID$(HE$,
    W+1,1) THEN 140
130 NEXT W
140 D1=W*(16^(Q)):D=D+D1:Q=Q-
    1:NEXT M
150 DE=INT(D):PRINT"$";H$;" =
    ";DE
160 PRINT:GOTO 20
```

Atari users should make the following changes to this program:

```
5 DIM HE$(16),H$(4)
80 J=1:H$=HE$(B,B+J-1):?
   H$;:B=1:C=C-1:D=16^C:I
   F C>-1 THEN 70
120 IF HE$(W+1,W+1)=H$(M,
    M) THEN 140
```

TI Serial Communications

I own a TI computer and have recently decided to buy a printer. While shopping around, I noticed that some printers come with built-in or optional RS-232-C serial interfaces. Does this mean that I can connect the printer to my computer with a "run of the mill" printer cable, or would I still need to buy a TI interface card to get the printer working? If I need the interface card, what purpose does the built-in interface serve?

Crandall Chow

You do need the interface card. A serial data link can transmit one bit (binary 1 or 0) of information at a time, but the computer and printer handle each ASCII character as a byte (eight-bit binary number). Since a byte contains eight bits, you can't send the whole chunk at once through a serial link.

Picture a group of eight friends walking side by side. If they come to a narrow turnstile, they can't all enter at once, so they pass through singly. When everyone is through the turnstile, they reassemble the group and march eight abreast once more. First the group is broken up, then it is reassembled.

The analogy explains why you need an interface at both ends of the serial link. At the computer's end, you need an interface to break each ASCII byte into eight bits and send each bit down the line in order. At the other end of the link, the printer's interface converts each series of eight bits back into a byte which the printer can handle as an ASCII character. In addition to the data bits, extra bits are passed between the computer and printer to coordinate the transmission process.

Because each bit has to pass singly, you might expect serial transmission to be slower than parallel data transfer, which passes more than one bit at once. This is not always true, however. Since serial transmission uses a single data wire, it's less susceptible to electrical interference than the parallel arrangement, where a signal traveling down one of the eight parallel data wires tends to create "noise" on neighboring data wires. Hence, you can accurately send bits serially much faster than you can send bytes in parallel. For example, the RS-232 serial TI-to-printer link we use, which operates at 9600 bps (bits per second), is as fast or faster than any of the parallel links we use with other computers and printers.

Multiple Entry Points In ML

While disassembling ROM routines in my Commodore 64, I noticed that the LOAD routine at $E168 seems to begin with the low byte of an address, rather than an opcode. This is true of other routines as well. Is there something wrong with my disassembler, or have I missed something?

J. C. Vollmer

There's nothing wrong with your disassembler. You've come across a memory-saving machine language trick that can look baffling unless you already know its purpose: to provide more than one entry

point to a routine. Here's the segment of code in question:

```
VERIFY   E165 A9 01     LDA #$01
         E167 2C        .byte 2C
LOAD     E168 A9 00     LDA #$00
         E16A 85 0A     STA $0A
         E16C (common routine begins
              here)
```

The 64 uses the routine beginning at $E16C to do two different jobs, performing LOAD when the flag in location $0A is 0, or performing VERIFY when the flag is 1. When you enter this routine at $E168, the computer performs LDA #$00:STA $0A (load accumulator with 0, store accumulator in $0A to set the flag for LOAD) and falls through to the common code beginning at $E16C. If you start disassembling at $E168, that's exactly what you'll see.

So far, so good. But the byte at location $E167 looks out of place. To see what purpose it serves, look at the same code as it appears when you start disassembling at $E165:

```
VERIFY  E165 A9  01      LDA #$01
        E167 2C  A9  00  BIT $00A9
        E16A 85  0A      STA $0A
        E16C (common routine begins
             here)
```

After performing LDA #$01 (load the accumulator with 1 for VERIFY), the computer performs BIT $00A9. BIT compares nondestructively; it is ordinarily used to test certain bits without disturbing the value stored in the accumulator. Since the 2C opcode is BIT with absolute addressing, the two bytes after $E167 are picked up to form a low byte/high byte address. When the computer reaches $E16A, it stores a 1 in location $0A to set the flag for VERIFY. We don't care *about the results of the BIT comparison—it's just used to preserve the 1 in the accumulator and skip over the bytes in $E168 and $E169.*

Of course, the same thing could have been done by inserting BNE $E16A after LDA #$01. But that would use one more byte—a negligible difference in most programs, but significant if you're trying to pack an operating system into limited ROM space. The same technique is used to provide nine different entry points to an error-handling routine at $F6F8.

Note that your confusion arose partly because you disassembled $E168 by scrolling forward from a lower address. When you begin at $E168, A9 00 disassembles as LDA #$00. When you enter at $E165 and scroll forward, the same two bytes disassemble as $00A9.

In this case, there's a good reason for the difference. But any disassembler can be fooled on occasion, particularly if you scroll forward from data into a section of meaningful code. For instance, the disassembler interprets a space character ($20) as a JSR instruction, and picks up the two following bytes to form an address. When in doubt, begin disassembling at the exact spot where a routine begins. ©

HOTWARE: Software Best Sellers

This Month	Title	Publisher	Remarks	Systems: Apple	Atari	Commodore	IBM	Macintosh
Entertainment								
1.	*Flight Simulator*	Micrasaft	Aircraft simulation				●	
2.	*The Hitchhiker's Guide To The Galaxy*	Infacam	Camic adventure strategy game	●	●	●	●	●
3.	*Flight Simulator II*	SubLagic	Aircraft simulation	●	●	●		
4.	*F-15 Strike Eagle*	MicraPrase	Air cambat simulation game	●	●	●		
5.	*Exodus: Ultima III*	Origin Systems	Fantasy game	●	●	●	●	●
Education								
1.	*Typing Tutor III*	Siman & Schuster	Typing instruction pragram	●		●	●	●
2.	*Math Blaster!*	Davidsan	Introductary math pragram, ages 6-12	●	●	●	●	
3.	*New Improved MasterType*	Scarbaraugh	Typing instruction pragram	●	●	●	●	●
4.	*Word Attack!*	Davidsan	Ward meaning and usage pragram, grades 4-12	●	●	●	●	
5.	*Early Games*	Springbaard	Educatianal games, ages 2-6	●	●	●	●	
Home Management								
1.	*Print Shop*	Brøderbund	Do-it-yaurself print shap	●	●	●		
2.	*Print Shop Graphics Library*	Brøderbund	100 additianal graphics	●	●	●		
3.	*Andrew Tobias's Managing Your Money*	Meca	Hame financial pragram				●	
4.	*Fast Load*	Epyx	Laad-time speedup cartridge			●		
5.	*Bank Street Writer*	Brøderbund	Ward pracessar	●	●	●	●	

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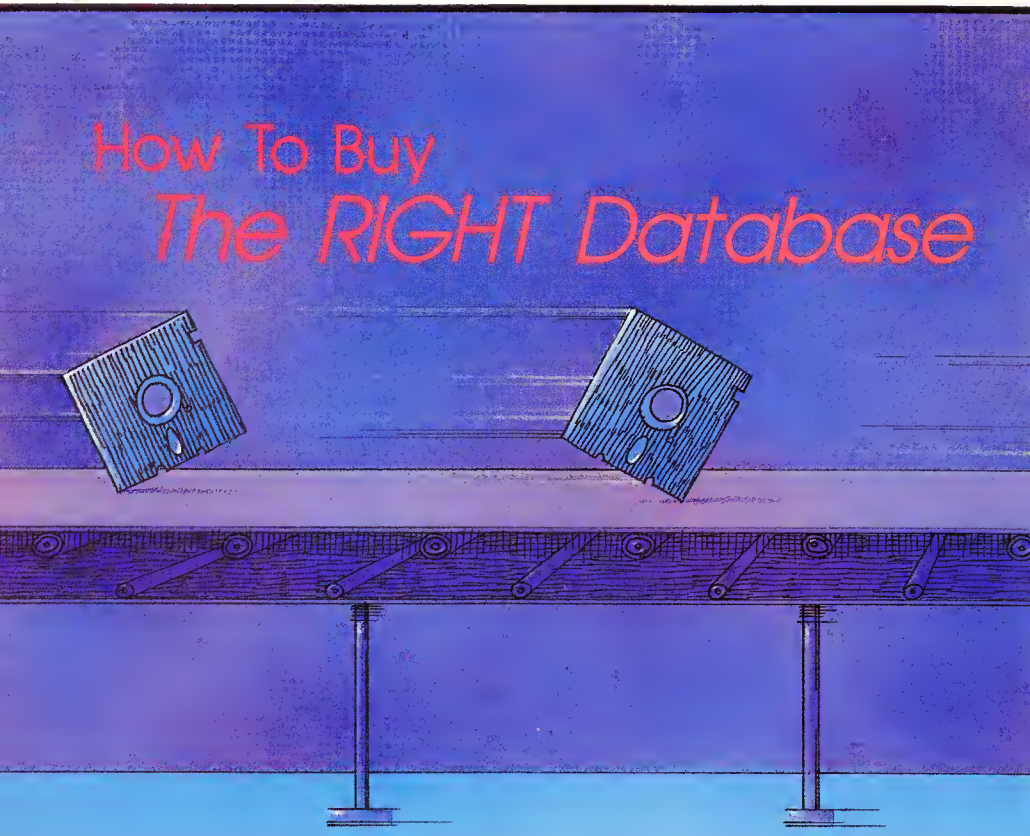


Selby Bateman, Features Editor

The idea behind a computer database program is simple—software which lets you store, organize, and selectively retrieve all kinds of information. And yet few programs can cause more frustration than a poorly chosen, inappropriate database system. No matter how big or small your information processing needs, it's better to pinpoint what you need before you buy.

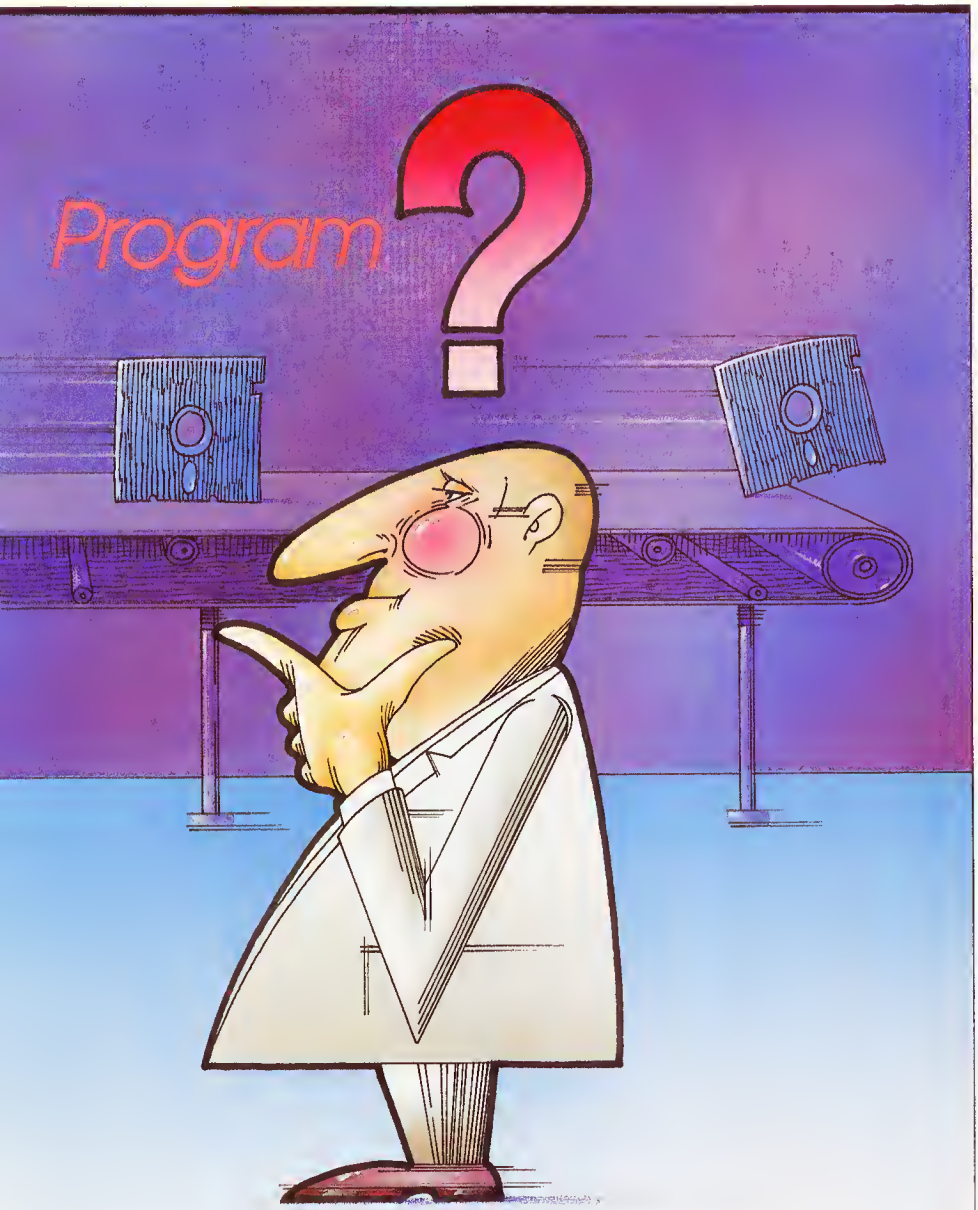
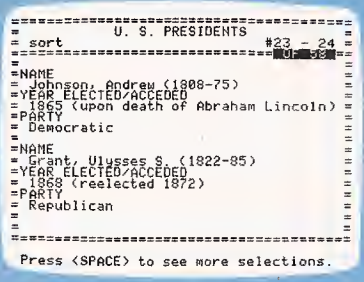


Illustration by Lee Noei



A Friendly Introduction

Some people avoid database programs because of the often laborious and intimidating commands and rules which must be learned.

Realizing this, an increasing number of manufacturers are making their programs easier to use, more intuitive, and less dependent on arcane command codes and relational symbols. There's even a database program for children—*Friendly Filer* (Grolier Electronic Publishing, $39.95), designed to work with *Friendly Files* ($14.95), a series of prepared database disks on various topics.

Friendly Filer is menu-driven and includes a self-teaching tutorial on the fundamentals of database operations. Though aimed primarily at children in the classroom or home (ages eight and above), it's also an easy introduction to simple filing and retrieving for adults.

The sample screen shown here (Apple II-series version) displays a portion of the program which is sorting the U.S. presidents in the chronological order of their tenure in office. From what is displayed, you could also arrange and retrieve information under the categories of NAME and PARTY as well. The program can include up to 360 records of 7 fields each, with 37 characters per field. (Versions are also available for the IBM PC, PCjr, and Commodore 64.)

You're getting ready to buy your first database program. You've read the magazines and realize that the database world can range from a free type-in BASIC listing to a $700 integrated software package—and everything in between. How do you determine which program is right for you?

Comparing products isn't easy, but keep in mind that there are three general types of databases classified by the method and extent of their operations: the *filing program*, the *file manager*, and the full-fledged *database management system*, or DBMS.

Manufacturers may fail to distinguish between the three when promoting their products, but knowing the differences can save you money and unnecessary headaches. For instance, a business person who tries to use a simple file manager to keep track of extensive employee or inventory records will immediately realize that the limitations far outweigh the cost savings. Similarly, if your only desire is to organize a holiday card list or a bridge club roster, a major database system such as *dBase III* for the IBM PC or MicroSoft *FILE* for the Macintosh will be far too expensive and complicated.

Every database, no matter how large or small, is built on three types of related organizing structures: the *field*, the *record*, and the *file*. How a database uses these components determines whether the software is a filing program, a file manager, or a database system.

Starting with the simplest component first, a *field* is merely a basic piece of information: a name, an address, a phone number, a zip code, an inventory number, or whatever. A field could consist of only one character or many characters. Some database programs limit the length of each field, and others let you specify any length.

A collection of related fields is a *record*. For example, a record in an address database might consist of six fields: the person's name, street address, city, state, zip code, and phone number. (Some programs might treat the area code as a separate field from the local phone number, or lump the whole address into a single field.) You can think of a record as an index card in a filing box.

Finally, a collection of related records is a *file*. Extending the above example, all the names, addresses, and phone numbers in your list would make up a file. Or a list of all the employees working for a department or a company could be a file. If you think of a record as an index card containing written fields, then a file would be a whole box of index cards.

For small databases, card files are sufficient. The advantage of a computerized database is that you can more easily add, delete, and update records, search for individual records and fields, and sort records according to information in various fields. Suppose a card file contains 300 cards, each representing a member of an organization. The cards are arranged in alphabetical order by last name. It's easy to look up a certain record by name, but if you want to find out how many members have not paid their 1985 dues, you have to laboriously examine each card in the whole file.

A computerized filing program gives you the power to find that information almost instantly. If the payment status of dues is kept as a field within each record, you can just ask the program to print out all

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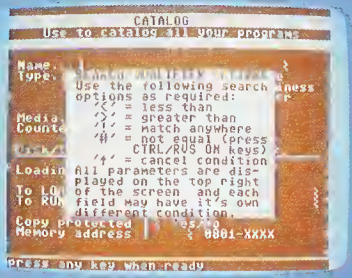

Database Windows

As developers of commercial database programs strive to make their products easier and more flexible to use, they are turning to such features as help screens and pop-up information windows.

Batteries Included's new version of *The Consultant* database management system ($79.95 for Commodore 64) includes help screens in the form of pop-up windows. In the sample shown here, a window has appeared over the form being used to catalog programs. The help screen has reminders about the relational modifiers which are used to help order the information with *The Consultant*. Another reminder along the bottom of the window advises you that each field may have its own status.

Integrated Graphics

Some database programs can now generate graphics to represent information contained in their files.

The new IBM PC and PCjr version of Timeworks' *Data Manager 2*, for example, is a storage and retrieval system which also contains report-writing, graphics, and label-making capabilities. It's priced at $129.95. In addition to the graphics features, the program can be integrated with Timeworks' *Word Writer* word processor so you can transfer data to documents. (Commodore 64 version $49.95.)

In the sample screen shown here, the names of sales team members and their projected sales totals and percentages have been pulled out of the database and combined to create a pie chart.

the records with a zero in the dues field. The more sophisticated file managers and database systems provide even more ways to order and retrieve information.

Some inexpensive database packages are little more than filing programs. That is, they let you put together your membership list and set a certain number of *key fields* which can be recalled. A simple filing program might let you assign *Dues Paid* as a key field. By commanding the program to search for this key field, you could quickly call up all of the records of those who have paid up.

Since these primitive filing programs promote ease of use over more powerful features, often they let you add information to each person's record without worrying about strictly defining each category. More advanced databases are very exacting—and unforgiving—in the ways they make you work with information.

The tradeoff here, of course, is that with a filing program you can quickly and easily keep up with your total list of members, but you may not be able to selectively retrieve as much information as you could with other systems. How many members have children? Which members have volunteered to drive their own cars on outings? Do some members live on the same street or in the same city or state? The answers to these questions may not be retrievable unless you've already defined the relevant information as key fields. Even then, you can't expect a simple filing program to contain all of the powerful features of more complex (and expensive) software.

The next level of database software is usually called a *data manager* or *file manager*. This is the type of database most often used in homes, schools, and some small businesses. While not as powerful as full-fledged database management systems, file managers have much more flexibility than filing programs. On the other hand, you'll have to learn and follow a more rigid system of data entry.

For instance, one of the attractions of a simple filing program is

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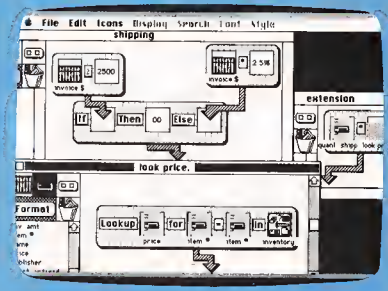
that you're generally free to enter any data you want without worrying about the number of characters in a particular field, the number of fields per record, and the number of records per file. But most file managers require you to preset all of those variables before you begin to enter the data. Therefore, you have to be fairly sure about the information you want to keep. If you don't allow enough room, the database will be so limited that you won't be able to fully use all of the program's features. But if you provide too much room for your records, valuable storage space will be wasted.

Perhaps the most important difference between a file manager and a full-fledged database management system is that the latter allows you to work with more than one file at a time. To transfer information between files, a file manager usually requires you to close the first file, open the second file, get the information, close the second file. open the first file, and return to the record where you left off. A true database management system, however, lets you work between at least two files simultaneously. In many cases, they also permit you to cross multiple records as well.

One problem with a powerful database system such as *dBase II* for the Apple II family, *dBase III* for IBM computers, or integrated packages like *Lotus 1-2-3* is that they require extensive amounts of time and effort to learn. These systems can be so daunting that they have spawned an entire subindustry which offers educational courses, seminars, and books just to teach individuals how to operate the programs. One company—Chase Scientific, Inc., of Santa Monica, California—even sells a series of videocassette training tapes for a wide range of the most powerful databases, spreadsheets, and integrated business packages. The videocassettes walk new users through the jargon, command codes, and complex options which are a part of these powerful packages.

Database Directions



Beyond complex key words, command codes, and data entry forms is the powerful yet easy to use database of the future, perhaps best exemplified today by Odesta's *Helix* for the 512K Macintosh with external disk drive or hard disk.

Priced at $395, *Helix* is called "a data-based information management and decision support system." That translates into the power and flexibility of major database management systems plus a Macintosh working environment which helps even the novice computer user perform a variety of data manipulation, calculation, and analysis functions.

Among other things, *Helix* lets you build visual flowcharts without worrying about command codes, file and retrieve information across fields and records, and work with several windows of information at the same time. The program simultaneously updates information in each window. You can also build special application models and templates for different needs.

In the screen shown here, *Helix* has correlated shipping and pricing information for a business database. Except for three numbers in the upper window, the user did not have to type anything to calculate information within different files. Most *Helix* functions are selected from pulldown menus with a mouse controller.

If you're planning to purchase a database program, here are a few fundamentals to keep in mind:

• **Can you get along without a computer database?** Database systems and file managers often wind up in closets when people find that they're spending more time and effort on the computerized file than was previously spent on index cards or sheets of paper—without a gain in productivity.

• **How will you use your database?** This is one of the most critical decisions you'll make. It's also where most mistakes are made when a database program is purchased. If you're in business, you'll have to think ahead to the specific categories of data organization and retrieval you'll need—inventory, employee files, financial records, client lists, etc. The program should be powerful enough to handle any anticipated demands because it's not always easy (and frequently impossible) to transfer information from one database program to another. On the other hand, if your application is not quite so important, it makes little sense to spend $500 for a program to keep track of something like a record collection.

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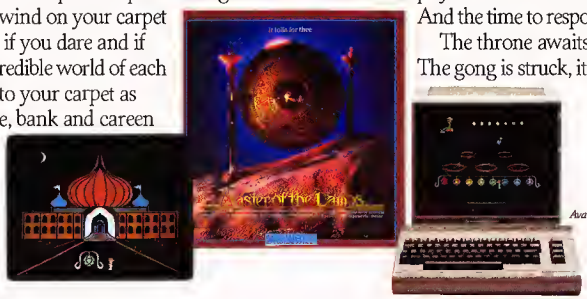

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A Database Glossary

appending—Adding records to an existing database file. Many databases handle this common task differently.

Boolean logic—Based on the algebraic logic developed by George Boole, this logic system uses such operators as AND, OR, and NOT for searching and sorting records.

calculated fields—A feature of some advanced databases which allows you to set up arithmetical and sometimes more sophisticated calculations with the records and fields within a file.

database management system (DBMS)—As distinguished from a file manager or filing program, this is the most sophisticated type of database program.

data entry form—A record structure supplied by the program or set up by the user which permits consistent entry and retrieval of information. Some databases provide *templates* of predefined forms for specific applications.

field—The pieces of information contained in a record.

file—A complete collection of related records which make up a database.

file manager—A common form of database program, more powerful than a simple filing program, but less flexible and powerful than a true database management system.

filing program—A simple database program characterized by its ease of use and limitations of power and flexibility.

index file—A collection of key words or fields in a database which the program uses to retrieve information you want.

key words (or key fields)—Fields which you define as keys for retrieving certain kinds of information from the database.

record—A related collection of fields that forms a single, complete entry in a database file.

relational database—In more advanced database management systems, a method of information storage and retrieval among different files which are internally linked.

relational operators—Sometimes called *relational modifiers*, these symbols are used in many database programs to establish relationships between pieces of information. Among these operators are less than (<), greater than (>), and equal to (=).

sort—The process by which a database program arranges information in any of various ways.

template—A predefined form or structure for database organization and information retrieval. Templates make it easier to enter raw information into the database, especially for inexperienced users.

• **Are the features easy to learn, flexible, and powerful?** Obviously, every program has tradeoffs. If you can't preview the program, read the descriptions on the package or in an advertisement. Watch out for programs that avoid giving specific information about features. Check for magazine reviews, and ask around to see if any friends or colleagues have experience with the program. User groups are another source of help.

• **How many characters, fields, records, and files will the database handle?** If you'll be storing names, addresses, cities, states, and zip codes, you can quickly estimate how many characters (including spaces) will be required. You can make the same simple calculations for any category before buying a program. What good will the database do if your records require 35 characters per field and the program allows a maximum of only 30 characters?

• **How fast can the program process information?** You'll probably have to see the program in action to answer this one. If you plan to work with hundreds of records or files, a slow database program can quickly exhaust your patience. Remember that the limiting factor may be your hardware. For instance, a disk- intensive program won't run very fast on a Commodore 64 system with a 1541 disk drive, because the 1541 is a relatively slow device. A program that manipulates the whole file in memory—as-suming you have enough RAM—runs much faster.

• **Do you need to work with more than one file of information at a time?** Database management systems generally allow this; file managers may not; and filing programs won't. Determine how important this feature will be to you.

• **Will a particular database work with your word processor or spreadsheet?** The real convenience of a database is almost always tied in some way to your writing or financial calculations. A database which can't share its information is generally to be avoided.

• **If the database system is complex, are there books, videocassettes, courses, or templates available to help you learn and use the system?** Check with your dealer, and again, with a local user group.

• **Does the manufacturer offer extended service after purchase?** A number of companies maintain toll-free help lines to answer questions and solve problems for their customers. Some companies also promise free or inexpensive upgrades as they issue later and better versions of their programs. ©

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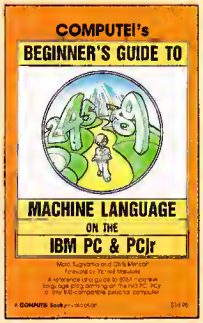

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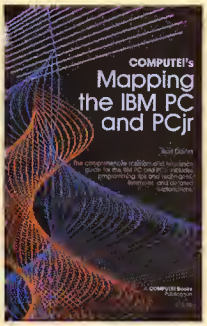

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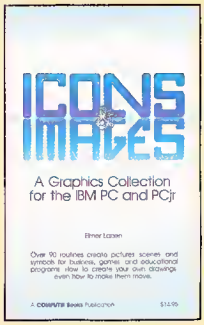

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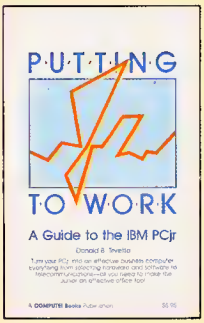

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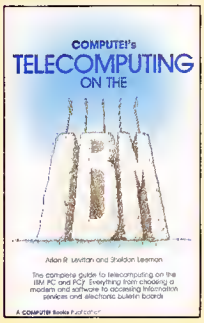

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Amazing ONLINE Databases

Kathy Yakal, Feature Writer

Defined loosely, databases have been around about as long as people have been communicating with each other. A database is simply a collection of information—which could be anything from an individual's detailed knowledge of a certain topic to a modern-day library. Traditionally, the main problem with databases has been organizing them so you can quickly find just the piece of information you need. But now, electronic databases make it possible to recall almost any kind of information faster than ever before.

Where do you go when you need information? If you're doing research for a school paper, you probably go to a library. If you want the results of yesterday's major league baseball games, you might look in the morning newspaper or call the paper's sports desk. If you want to identify the odd-looking birds that have been hanging out in your backyard, you could find a bird book, or call the local zoo or animal association.

In some cases, immediacy is essential. If your cat is sneezing and moping around the house a lot, you *could* write a letter to the veterinarian who has a column in the Sunday paper, hoping that he'll print your letter along with a diagnosis. But phoning a local vet makes more sense. Television shows that offer hints on repairing your home's plumbing or your car are helpful, but if you have a leaky faucet or a temperature gauge that's running hot, you'd best get an expert's advice fast.

A home computer with a modem offers another alternative for finding information. Thousands of online databases, ranging from small bulletin board systems to major information services, contain the answers to almost any questions imaginable. Today's online databases are repositories for encyclopedias, current and back issues of newspapers and magazines, professional journals, industry reports, airline schedules, shopping catalogs, and much more.

There's another aspect to online databases as well, one that goes beyond the computerized storage of published information. "It's not just taking what was published in print and putting it on a computer because it would be better and faster," says Matthew Lesko, publisher of *Information USA*, a monthly newsletter covering the database industry. "It's really using telecommunications to get similar-minded people to communicate sooner with each other."

Lesko recalls talking to an Iowa veterinarian who one day was called upon to treat a three-legged dog. The doctor belonged to a veterinarian's bulletin board system (BBS), so he posted an electronic message about the unusual creature.

"Overnight, this vet had responses from doctors in Chicago and Miami who had also treated three-legged dogs," says Lesko. "And he didn't have to wait six months for the case to appear in some vet journal, or for an annual convention."

There are three general types of online databases: BBSs, commercial information services, and specialized professional databases. They differ widely in the information they offer and the access fees they charge.

Calling a small BBS generally doesn't cost more than the price of the phone call (and only then if it's long-distance). Some BBSs have started charging for memberships, often just to limit the number of callers and make the board more accessible. The fees also help defray the expenses of operating a BBS, most of which are run by home computer enthusiasts in their spare time. Hundreds of these informal BBSs are scattered throughout the country, and they offer a wide range of online information and public domain software. Most of the information is oriented toward computer hobbyists.

If you're looking for a broader base of information and users, you may want to consider subscribing to a commercial information service. The most popular are CompuServe, The Source, Dow Jones News/Retrieval, Delphi, and American People/Link. These services are operated at central locations with mainframe computers and offer everything from stock market quotes and encyclopedias to teleconferences and back issues of *The Wall Street Journal*. Generally, they can be accessed with a local phone call from most major cities, thanks to long-distance networks leased by the services. Hourly rates range from about $5 to $100 or more, depending on time of access, the speed of your modem, and special services you may require.

For the most part, commercial information services cater to computer hobbyists and business people. If what you need is highly

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detailed information on a very specific subject—usually related to a professional or technical occupation—you can subscribe to a more specialized online database. A wide selection is available, from scientific and research clearinghouses to legal libraries. These are the most expensive databases of all, with access fees of $300 or $400 an hour not uncommon.

The regular information services are enough for most people, but even they can verge on overkill. "Commercial databases have been in existence for six or seven years, but they've been aimed at the business market and kept pretty technical and expensive," says Lesko. "In the business area, the average hourly online fee was $100. For the consumer, most of that stuff is in the library, so why should they pay $100 when they can just go and get it? Why should I pay $100 to read *The New York Times* when I can have it delivered to my door for 50 cents? Plus I can take it on the bus."

Lesko compares these early days of online databases to the food processor craze a few years back. Manufacturers were saying, *Look, you can make a whole meal with these things. Everything can be run through the food processor.*

"What some database people are saying is, *you can solve all the problems in the world if you buy my database.* Well, you can't, and there are more efficient ways to solve them. When you're oversold, you become easily disappointed."

People have to learn, he says, *when* it pays to use an online database—and when it doesn't. "What's happening is everyone gets modems and uses them to join an online database. The first month they get a bill for $100, and they stop using it."

There are as many reasons to subscribe to these services as there are reasons to be wary of them. Typically, their most popular features include sections devoted to specific computers, so users can trade information, exchange public domain programs, seek answers to technical problems, and share industry gossip.

Teleconferencing—such as CompuServe's popular CB simulator—provides a forum for people from all over the country to chat anonymously online. Teleconferences on special topics also are scheduled from time to time. Telegaming, ranging from simple computer versions of popular board and card games to fast-paced interactive fantasy and adventure games, draws a large audience. Online catalog shopping is beginning to pick up speed as more vendors advertise their products electronically.

In addition, information services provide some material unavailable elsewhere, such as electronic journals that are not in print. Frequent fliers can save money on airline tickets by finding the lowest fares online. And for people who avidly watch the stock market, access to what's happening on the trading floor with only a two-second delay can be well worth the money.

Online databases aren't for everybody, however. To avoid subscribing to one for the wrong reasons, spending a lot of money unnecessarily, and ultimately souring on the whole idea, Lesko has a few suggestions:

Do your homework. Dig before you decide on an online database. Go to information people, such as librarians. They've been in the database business a long time. Find out if the information you need is available from another source, and if the time it takes to access that source is acceptable for your purposes. Talk to experts in a particular field. They probably know about the best databases.

Try using the telephone without a modem. If you're looking for information on energy, for instance, there's a toll-free government hotline for almost anything you want to know about energy.

Be aware that you can get lots of information free, if you're not in a hurry. If you want to monitor legislation, there are at least half a dozen online databases you can call, but they can cost as much as $200 an hour. Alternatively, you can make a free phone call to your local congressional office, which can call the Bill Status Office, which has *the* database on legislation. They'll send you a printout at no charge. ("There are less expensive alternatives [to online databases]," explains Lesko, "but usually no one has hired a $50,000 a year salesman to go out and tell you about it. People aren't aware of the alternatives, so databases are becoming the ultimate buyer's beware market.")

Test drive a database. Find a way to try out a database as cheaply as possible to see if you're really going to use it enough. If you have an acquaintance who uses a certain database, ask to pay for a few hours' use on their password before signing up for a subscription yourself. Sometimes when you buy a modem or terminal program, the package includes a free subscription and some free access time on some information services.

Look at reference books listing databases. There are several available, including the *Computer Data and Database Source Book* (Matthew Lesko, Avon Books) and the *Omni Online Database Directory 1985* (Owen Davies and Mike Edelhart, Collier Books).

Once you've decided on a database, learn how to use it before signing on. Nothing is more irritating than watching the minutes (and dollars) tick off while you try to find your way through and out of the myriad menus in a huge electronic database.

An old saying favored by many schoolteachers is that if school teaches you anything, it should teach you how to learn. Online databases are new tools for people of all ages to improve their learning skills, share information, and—as Lesko says—make contact with like-minded people.

"The only thing that limits us from growth is taking time to reinvent the wheel," he says. "If someone across the street has an answer and can share it, then I can go on and use those resources somewhere else.

"As a nation—and it's an idealistic viewpoint—we will really progress a lot faster as electronic information becomes increasingly available. I think our temperament is to share, and telecommunications is going to make that happen faster." ©

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Softball Statistics

Roger Felton

It's time to get ready for the midsummer and fall softball leagues, and you'll want to keep track of all the individual and team results. With "Softball Statistics," it's easy. You can enter data for each player's times at bat, hits, runs, and so on. The program automatically computes batting averages, stores cumulative results on disk or tape as the season progresses, generates formatted printouts with sorted rankings for all players, and more. Originally written for the Atari (with at least 16K RAM for tape or 24K for disk), the program has been enhanced and adapted for the Commodore 64, VIC-20 (with at least 8K expansion), Plus/4, 16, PET, TI-99/4A (regular BASIC), IBM PC and PCjr (disk only), and Apple II series (disk only). An 80-column printer is optional but recommended. The program also can be translated for additional computers or modified to track statistics for other sports as well.

What's the worst position on a softball team? Catchers have to squat in an uncomfortable stance for an hour or more and duck hazardous foul balls. Pitchers have to duel with mighty sluggers and dodge powerful line drives. Basemen have to stretch their bodies like rubber bands to nab wayward throws from their teammates while keeping at least one toe on the base bag. And outfielders have to scoop up bouncing grounders with the knowledge that no one is backing them up besides the outfield fence.

But as demanding as all these positions are, there's another that could be worse—that of team statistician. Keeping track of your teammates' performance is often a laborious, thankless job. Sometimes the statistician is a reserve player or friend of the team who doesn't even get to play. Caged in the dugout, the statistician is supposed to document every hit, run, and walk, and boost team morale by contributing lively chatter. After the game, the statistician has to spend hours punching numbers into a calculator to figure out the batting averages.

"Softball Statistics" makes that job much easier. After each game, the program prompts you to enter vital stats for each player. Then it automatically calculates the batting averages and prints sorted rankings on the screen or printer. It can also print sorted rankings for hits, runs, and runs batted in. These game statistics can then be merged with data for all previous games, and updated season results can be sorted by category and printed. Finally, the program lets you store the cumulative statistics on disk or tape.

We've provided versions of Softball Statistics for more than ten different computers, but if a version for your computer is not included, it can be translated without too much difficulty if you're familiar with tape or disk input/output on your machine. In all versions, the input/output routine starts at line 3000 and the printing routine starts at line 4000.

If you're a professional baseball or Little League fan, you can use Softball Statistics to follow the fortunes of your favorite team. And with modifications, it could be adapted to a wide variety of sports.

Typing The Program

Because the main routines in Softball Statistics are compatible with nearly all Microsoft BASIC languages, Program 1 is a general version for all computers. An exception is Atari BASIC, which handles strings somewhat differently than Microsoft BASIC. Therefore, if you have an Atari 400/800/XL/XE with at least 16K RAM, type in Program 6 *only*. Do not type in Program 1.

If you have any other computer, type in Program 1 *plus* the modifications for your particular machine. Program 2 contains the modifications for the Commodore 64, VIC-20, Plus/4, 16, and PET. The :rem at the end of each line is a checksum value for the VIC and 64 "Automatic Proofreader" program. If you have one of the other Commodore computers, ignore and *do not type* the :rems. Program 3 has modifications for the IBM PC and PCjr. Program 4 has modifications for the Apple II series, and Program 5 contains modifications for the TI-99/4A. Example: If you have a Commodore 64, you would type in Program 1 and the lines in Program 2 as a single program.

Since Program 1 is a general version for several computers, it is listed without "Automatic Proof-

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reader" checksums (see "COMPUTE!'s Guide to Typing in Programs" elsewhere in this issue). *Be extra careful when typing Program 1 because a mistyped line could yield inaccurate results even if the program runs without errors.*

Proofreader checksums are included for the Atari version of Softball Statistics, since it is a self-contained program, and for the Commodore, IBM, and Apple modifications (Apple readers should note that an Apple version of the Automatic Proofreader is new this month; see the "Apple Automatic Proofreader" article in this issue). We recommend loading the Proofreader before typing either Program 1 or the modifications—simply ignore the checksums returned on the screen when you enter lines from Program 1.

When you finish typing either Program 6 for Atari or Program 1 plus the modifications for your computer, save a copy on disk or tape for safekeeping before running it for the first time.

Entering The Roster

The next step is to enter your team's roster into the program. Softball Statistics can handle a team with up to 20 players and stores this information in DATA statements as part of the program itself.

In all versions, the DATA statements begin at line 2070. The statements must conform to a predefined format: a two-digit jersey number followed by a space, then the player's first or last name. Precede one-digit jersey numbers with a zero, such as 08 for 8. Names can be any length, but only the first seven characters appear on the printouts. Each entry is separated by a comma. Example:

```
2070 DATA 23 LEE,17 JACKSON,33
JOHNSTON,10 LONGSTREET,04
PICKETT
```

In the output, "JOHNSTON" and "LONGSTREET" would appear as "JOHNSTO" and "LONGSTR."

The programs are listed with dummy entries in the DATA statements, such as 44 JIM and 10 PLAYERX. Substitute your own team members for these entries. If your team has fewer than 20 players, leave the remaining dummy entries in the DATA statements; the program must have 20 entries to function, and it ignores the PLAYERX entries.

Finally, put your own team's name in the string statement at line 140 in the general version or line 120 in the Atari version. If you have a TI-99/4A, make sure the printer configuration statements at lines 4020 and 5010 are correct for your printer (see your manual). With these adjustments, Softball Statistics is now ready to run.

Important note: You should avoid tinkering with the player name DATA statements once you've started using the program. Otherwise, there will be problems when it attempts to compute cumulative season totals. If you drop a player from the roster and replace him with another player, the new player's totals will contain the old player's results as well. So to drop a player, substitute a PLAYERX dummy entry at that position in the DATA statement. Of course, this means the dropped player's results will no longer be included in the team totals for the season. If you wish to retain a dropped player's results in the team totals, leave the player's name in the DATA statement and enter 999 in response to all input prompts following subsequent games (see below).

Compiling Statistics

Once the roster is entered, you can run the program. It begins by asking for statistics for individual games. The first prompt reads:

```
WHO DID YOU PLAY?
```

Respond with the opposing team's name—such as KELLY'S DINER—and press RETURN (or ENTER if you have an IBM or TI). The next prompt asks:

```
ENTER YOUR SCORE AND THEIR
SCORE (SEPARATED BY A
COMMA):
```

For instance, if your team lost by a score of 9 to 5, you'd type 5,9 and press RETURN.

The program now begins asking for individual player statistics. If the first player name on your roster is LENNY, the program prints:

```
LENNY'S STATISTICS FOR THIS
GAME:
```

and then prompts you, one by one, to enter the number of times at bat, runs scored, hits, runs batted in (RBIs), doubles, triples, home runs, and walks. At each prompt, type the appropriate number and press RETURN. After the last prompt, the program continues to the next player on the roster and repeats the cycle.

If a certain player missed a game, type 999 at the first prompt. This automatically enters zeros for all his stats and skips to the next player. In fact, entering 999 at any prompt inputs zeros for all of a player's remaining game stats.

Individual Printouts

After you type the last statistic for the last player, the program prints the message WORKING while it sorts all the data. (The WORKING message appears at other points in the program during sorts, since the sort routine is written in BASIC and is not particularly fast.) In a few moments, the program says:

```
DO YOU WANT A PRINTOUT OF
THE GAME'S STATS (Y/N)?
```

Figure 1: Printout of Team Game Stats

ROSTER IS SORTED BY BATTING AVERAGE

#	PLAYER	AB	RUNS	HITS	RBI	2B	3B	HR	BB	AVG
#9	MARTY	6	2	5	3	2	1	1	0	0.833
#3	JOHN	5	2	4	2	2	0	1	1	0.800
55	MIKE	4	1	3	1	1	0	1	0	0.750
44	JIM	5	4	3	1	2	0	0	0	0.600
#8	KEN	4	1	2	1	1	1	0	0	0.500
#8	BOB	6	3	3	2	2	0	0	2	0.500
22	PETE	5	1	2	2	0	0	0	0	0.400
#7	BILL	5	1	2	0	1	0	0	0	0.400
#6	BARRY	6	2	2	0	1	0	0	3	0.333
TOTALS		46	17	26	12	12	2	3	6	0.565

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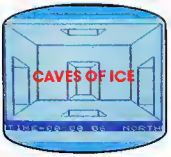

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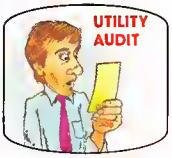

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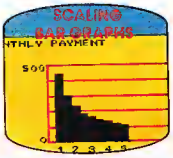

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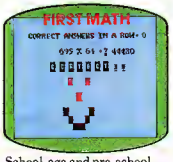

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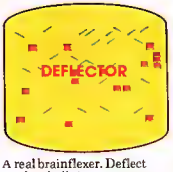

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Type Y for yes or N for no. If you press N, the program asks if you want to input data for another game. If you press Y, it asks:

TO SCREEN OR PRINTER (S/P)?

Type S or P. Softball Statistics then prints the individual stats for all team members for that game, sorted in descending order by batting averages (see Figure 1). Because the output is formatted for an 80-column printer, it looks odd—but is still readable—on screens with less than 80 columns. By pressing any key, you can stop the screen or printer output at any time. Start output again by pressing P.

Next, the program asks:

DO YOU WANT SORTED PRINTOUTS OF HIT, RBI, AND RUN LEADERS (Y/N)?

Again, type Y for yes or N for no. If you type N, the program asks if you want to input stats for another game. If you answer Y, it asks again if you want the output directed to the screen or printer, and then prints sorted rankings for the various slugging categories for that game (see Figure 2). As before, you can stop the output by pressing any key and restart it by pressing P.

Finally, the program asks:

DO YOU WANT TO INPUT STATS FROM ANOTHER GAME (Y/N)?

Usually you type N at this prompt, unless you're entering results of more than one game. If you type Y, the program repeats the entire process described above.

Season Totals

Softball Statistics makes it easy for you to tabulate running totals for the entire season by storing game results on tape or disk. After you've entered and viewed the stats for the most recent game, the program asks:

WOULD YOU LIKE TO MERGE IN DATA FOR THE YEAR (Y/N)?

The first time you run Softball Statistics, of course, you won't have any previous data on disk or tape, so you'd answer N, skipping to the next prompt. During subsequent runs, you'd answer Y to merge in data for the year. The program then requests a filename for the disk or tape data file and merges these existing stats with the results you've entered for the latest game or games.

Figure 2: Printouts of Slugging Stats

HITS SORT:

#	PLAYER	HITS
09	MARTY	5
03	JOHN	4
55	MIKE	3
44	JIM	3
08	BOB	3
06	BARRY	2
08	KEN	2
22	PETE	2
07	BILL	2
TOTAL HITS		26

RBIS SORT:

#	PLAYER	RBIS
09	MARTY	3
03	JOHN	2
22	PETE	2
06	BOB	2
44	JIM	1
55	MIKE	1
08	KEN	1
07	BILL	0
06	BARRY	0
TOTAL RBIS		12

RUNS SORT:

#	PLAYER	RUNS
44	JIM	4
08	BOB	3
03	JOHN	2
06	BARRY	2
09	MARTY	2
55	MIKE	1
08	KEN	1
22	PETE	1
07	BILL	1
TOTAL RUNS		17

Season totals are then computed automatically, and the program asks:

DO YOU WANT A PRINTOUT OF THE YEAR'S STATS (Y/N)?

If you type N, you're asked to specify a filename to save the updated data file, and the program ends. If you answer Y, the program asks if you want output directed to the screen or printer, and then prints season totals for all players. This printout includes the team's win-loss record and sorts players in descending order by batting averages (see Figure 3).

Afterward, the program asks if you want sorted printouts for hits, RBIs, and runs—again, based on season totals (these charts resemble those in Figure 2). Finally, the program gives you the opportunity to save the updated data file on disk or tape until the next game.

Softball Computing

If you're interesting in programming, you can learn a lot by studying Softball Statistics because it's written in straight BASIC with no machine language. In fact, the input/output routine beginning at line 3000 and the printing routine starting at line 4000 are general enough to be adapted to your own programs.

You don't have to be a programmer, though, to appreciate Softball Statistics. If you're a softball statistician, no longer do you have the worst position on the team. Maybe it's the shortstop....

Figure 3: Printout of Season Totals

STATISTICS FOR THE YEAR:
RECORD FOR THE YEAR: WINS:2 LOSSES:1

ROSTER IS SORTED BY BATTING AVERAGE

#	PLAYER	AB	RUNS	HITS	RBI	2B	3B	HR	BB	AVG
03	JOHN	16	10	11	11	5	4	2	3	0.688
06	BARRY	18	12	11	8	4	1	4	5	0.611
07	BILL	17	10	10	7	3	3	3	2	0.588
55	MIKE	18	10	10	10	5	3	1	4	0.556
44	JIM	10	9	9	7	5	2	1	2	0.500
08	BOB	17	12	8	7	4	1	2	1	0.471
09	MARTY	17	10	8	10	4	2	3	4	0.471
22	PETE	17	7	6	4	3	1	1	3	0.353
08	KEN	17	6	6	7	3	1	2	4	0.353
TOTALS		155	86	79	71	36	18	19	28	0.510

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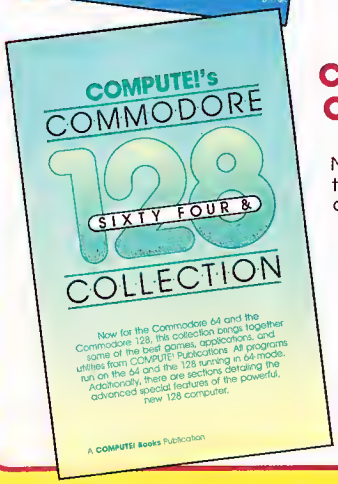

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Program 1: Softball Statistics, Main Program

Version By Patrick Parrish, Programming Supervisor

```
100 D5=5
110 D6=2
120 PL=20
130 DIM 8(9),CC(20),IN(21),ST(
    8),RT(20,8),TT(20,8),F$(8)
    ,NA$(20),R$(21)
140 TM$="TEAM NAME"
150 C$="0000"
160 FOR I=1 TO 8
170 READ F$(I)
180 NEXT I
190 FOR J=1 TO PL
200 READ NA$(J)
210 NA$(J)=MID$(NA$(J),1,10)

220 NEXT J
230 FOR J=1 TO PL
240 R$(J)=MID$(NA$(J),1,LEN(NA
    $(J)))+MID$("{10 SPACES}",
    1,10-LEN(NA$(J)))
250 FOR I=1 TO 8
260 TT(J,I)=0
270 ST(I)=0
280 NEXT I
290 NEXT J
300 GOSUB 2030
310 PRINT "GAME STATISTICS"
320 PRINT "WHO DID YOU PLAY"
330 INPUT OT$
340 PRINT "ENTER YOUR SCORE AN
    D THEIR SCORE (SEPARATED B
    Y A COMMA)"
350 INPUT YS,TS
360 W=W+A8S(YS>TS)
370 L=L+ABS(TS>YS)
380 FOR J=1 TO PL
390 IF MID$(NA$(J),4,7)<>"PLAY
    ERX" THEN 420
400 R$(J)=R$(J)+"000000000000
    0000000000000000000.000"
410 GOTO 600
420 GOSUB 2030
430 PRINT MID$(NA$(J),4,LEN(NA
    $(J)));"'S STATISTICS FOR
    THIS GAME:"
440 FOR I=1 TO 8
450 8(I)=0
460 PRINT F$(I)
470 INPUT 8(I)
480 IF LEN(STR$(8(I)))>=D5 THE
    N 450
490 IF B(I)<>999 THEN 540
500 FOR K=I TO 8
510 8(K)=0

520 NEXT K
530 I=8
540 NEXT I
550 GOSUB 1350
560 FOR I=1 TO 8
570 RT(J,I)=RT(J,I)+B(I)
580 TT(J,I)=TT(J,I)+B(I)
590 NEXT I
600 NEXT J
610 GOSU8 1670
620 MM=0
630 FOR I=1 TO 8
640 FOR J=1 TO PL
650 ST(I)=ST(I)+TT(J,I)
660 NEXT J
670 B(I)=ST(I)
680 NEXT I
690 R$(J)=""
700 GOSU8 1350
710 TT$=R$(J)
720 GOSU8 1560
730 PRINT "DO YOU WANT TO INPU
    T STATS FROM ANOTHER GAME
    (Y/N)?"
740 GOSU8 1920
750 IF A$="Y" THEN 230
760 GOSUB 2030
770 PRINT "WOULD YOU LIKE TO M
    ERGE IN DATA FOR THE YEAR
    (Y/N)?"
780 GOSUB 1920
790 IF A$="N" THEN 840
800 C=1
810 GOSU8 3010
820 W=SW+W
830 L=SL+L
840 GOSUB 1670
850 FOR J=1 TO PL

860 FOR I=1 TO 8
870 IF A$="N" OR MID$(NA$(J),4
    ,7)="PLAYERX" THEN 920
880 B(I)=VAL(MID$(R$(J),11+(I-
    1)*4,4))
890 B(I)=RT(J,I)+8(I)
900 RT(J,I)=8(I)
910 GOTO 930
920 8(I)=RT(J,I)
930 ST(I)=0
940 NEXT I
950 R$(J)=MID$(R$(J),1,10)
960 GOSUB 1350

970 NEXT J
980 MM=1
990 FOR I=1 TO 8
1000 FOR J=1 TO PL
1010 ST(I)=ST(I)+RT(J,I)
1020 NEXT J
1030 8(I)=ST(I)
1040 NEXT I
1050 R$(J)=""
1060 GOSUB 1350
1070 TT$=R$(J)
1080 GOSU8 2030

1090 PRINT "DO YOU WANT A PRIN
     TOUT OF THE YEAR'S STATS
     (Y/N)?"
1100 GOSU8 1920
1110 IF A$="N" THEN 1140
1120 GOSUB 1670
1130 GOSU8 1560
1140 PRINT "DO YOU WANT TO SAV
     E THE DATA (Y/N)?"
1150 GOSU8 1920
1160 IF A$="Y" THEN 1180

1170 END
1180 C=2
1190 GOTO 3010
1200 REM SHELL SORT
1210 FOR J=1 TO PL
1220 IN(J)=J
1230 CC(J)=VAL(MID$(R$(J),BB,E
     ))
1240 NEXT J
1250 FOR J=PL-1 TO 1 STEP -1

1260 FOR I=1 TO J
1270 IF CC(IN(I))>CC(IN(I+1))T
     HEN 1310
1280 TE=IN(I)
1290 IN(I)=IN(I+1)
1300 IN(I+1)=TE
1310 NEXT I
1320 NEXT J
1330 RETURN
1340 REM BUILD R$
1350 IF 8(1)=0 THEN 1380
1360 IF 8(3)=0 THEN 1380
1370 GOTO 1410
1380 8(9)=0
1390 AV$="0.000"
1400 GOTO 1420
1410 B(9)=INT(8(3)/8(1)*1000+.
     5)/1000+.0001
1420 FOR I=1 TO 8
1430 8$=STR$(8(I))
1440 8$=MID$(C$,1,D5-LEN(8$))+
     MID$(B$,D6,LEN(8$))
1450 R$(J)=R$(J)+B$

1460 NEXT I
1470 IF B(9)=0 THEN 1530
1480 AV$=STR$(8(9))
1490 IF MID$(AV$,1,1)<>" " THE
     N 1510
1500 AV$=MID$(AV$,2,6)
1510 IF MID$(AV$,1,1)<>"." THE
     N 1530
1520 AV$="0"+AV$
1530 R$(J)=R$(J)+MID$(AV$,1,5)

1540 RETURN
1550 REM SORT BY AVERAGES
1560 BB=43
1570 E=5
1580 GOSUB 1210
1590 IF MM=1 THEN 1630
1600 GOSUB 2030
1610 PRINT "DO YOU WANT A PRIN
     TOUT OF THE GAME'S STATS
     (Y/N)?"
1620 GOSUB 1920
1630 IF A$="N" THEN 1660
1640 GOSUB 1960
1650 GOTO 4010
1660 RETURN
1670 PRINT
1680 PRINT "WORKING..."
1690 RETURN
1700 PRINT

1710 PRINT "DO YOU WANT SORTED
      PRINTOUTS OF HIT, RBI, A
     ND RUN LEADERS (Y/N)?"
1720 GOSUB 1920
1730 IF A$="N" THEN 1760
1740 GOSUB 1960
1750 GOTO 1770
1760 RETURN
1770 GOSUB 1670
1780 88=19
1790 E=4
1800 GOSU8 1210
1810 I=3
1820 GOSUB 5000

1830 BB=23
1840 GOSU8 1210
1850 I=4
1860 GOSU8 5000
1870 8B=15
1880 GOSUB 1210
1890 I=2
1900 GOSU8 5000
1910 RETURN
1950 RETURN
1960 PRINT
1970 PRINT "TO SCREEN OR PRINT
     ER (S/P)?"
2020 RETURN
2040 RETURN

2050 DATA TIMES AT BAT,RUNS,HI
     TS,RBIS,DOUBLES,TRIPLES,H
     OME RUNS,WALKS
2060 REM LIST PLAYERS BY NUM8E
     R & NAME
2070 DATA 44 JIM,22 PETE,03 JO
     HN,08 KEN,55 MIKE
2080 DATA 06 BARRY,07 BILL,08
     BOB,09 MARTY,10 PL
     AYERX
2090 DATA 11 PLAYERX,12 PLAYER
     X,13 PLAYERX,14 PLAYERX,1
     5 PLAYERX
2100 DATA 16 PLAYERX,17 PLAYER
     X,18 PLAYERX,19 PLAYERX,2
     0 PLAYERX
3000 REM INPUT/OUTPUT ROUTINE
4000 REM PRINT ROUTINE
```

Program 2: Softball Statistics, Commodore Modifications

Version By Patrick Parrish, Programming Supervisor

Please refer to "COMPUTE!'s Guide to Typing In Programs" before entering this listing.

```
1920 GET A$                    :rem 17
1930 IF A$="" THEN 1920:rem 61
1940 IF (A$<>"Y") AND (A$<>"N"
     ) THEN 1920               :rem 186
1980 GET P$                    :rem 3B
1990 IF P$="" THEN 1980:rem 88
2000 IF (P$<>"S") AND (P$<>"P"
     ) THEN 19B0               :rem 206
2010 DE=-(P$="S")*3-(P$="P")*4
                               :rem 205
2030 PRINT CHR$(147)           :rem 64
3010 GOSUB2030:PRINT"ENTER DAT
     A FILE NAME:":INPUTFF$
                               :rem 161
3020 PRINT"{DOWN}DISK OR CASSE
     TTE (D/C)?"               :rem 21
3030 GETA$:IF((A$<>"C")AND(A$<
     >"D"))ORA$=""THEN3030
                               :rem 227
3040 IFA$="D"THEN3060 :rem 120
3050 D1=0:G$="":GOTO3070
                               :rem 13
3060 FF$="@0:"+FF$:D1=1
                               :rem 156
3070 IFC=2THEN3130             :rem 1
3080 IFD1=1THENG$=",S,R"
                               :rem 85
3090 OPEN1,1+7*D1,8*D1,FF$+G$:
     GOSUB3160:INPUT#1,SW,SL:F
     ORJ=1TOPL                 :rem 93
3100 INPUT#1,R$(J)             :rem 229
3110 R$(J)=MID$(NA$(J),1,LEN(N
     A$(J)))+MID$("{10 SPACES}
     ",1,10-LEN(NA$(J)))+R$(J)
                               :rem 70
3120 NEXTJ:GOSUB3160:CLOSE1:GO
     SUB3160:RETURN            :rem 82
3130 IFD1=1THENG$=",S,W"
                               :rem B6
3140 OPEN1,1+7*D1,1+7*D1,FF$+G
     $:GOSUB3160:PRINT#1,W;CHR
     $(13);L:FORJ=1TOPL:rem 11
3150 PRINT#1,MID$(R$(J),11,32)
     :NEXTJ:GOSUB3160:CLOSE1:G
     OSUB3160:END              :rem 1B
3160 IFD1=0THENRETURN          :rem 74
3170 IFO=0THENOPEN15,B,15:O=1
                               :rem 202
3180 INPUT#15,A,B$,C,D:IFATHEN
     PRINTA,B$,C,D:STOP
                               :rem 1B7
3190 RETURN                    :rem 173
4010 OPENDE,DE:PRINT#DE:IFMM=1
     THENT$="THE YEAR":GOTO403
     0                         :rem 237
4020 T$="THIS GAME"            :rem 17
4030 PRINT#DE,"STATISTICS FOR
     {SPACE}"T$":":IFMM=1THEN4
     050                       :rem 33
4040 PRINT#DE,TM$" VS "OT$"
     {4 SPACES}SCORE:"YS"-"TS:
     GOTO4060                  :rem 161
4050 PRINT#DE,"RECORD FOR THE
     {SPACE}YEAR:{2 SPACES}WIN
     S:"W" LOSSES:"L           :rem 217
4060 PRINT#DE:PRINT#DE,"ROSTER
      IS SORTED BY BATTING AVE
     RAGE":PRINT#DE            :rem 6B
4070 PRINT#DE,"#{2 SPACES}PLAY
     ER{4 SPACES}AB{3 SPACES}R
     UNS{3 SPACES}HITS
     {4 SPACES}RBI{5 SPACES}2B
     {5 SPACES}3B{5 SPACES}HR"
     ;                         :rem 2
4080 PRINT#DE,"{5 SPACES}BB
     {6 SPACES}AVG":FORJ=1TOPL
                               :rem 239
4090 IFMID$(R$(IN(J)),4,7)="PL
     AYERX"THEN4160            :rem 7
4100 PRINT#DE,MID$(R$(IN(J)),1
     ,10)" ";                  :rem 219
4110 FORI=1TOB:Q=0:FORK=0TO3:I
     FMID$(R$(IN(J)),11+(I-1)*
     4+K,1)<>"0"THENQ=1
                               :rem 181
4120 IFMID$(R$(IN(J)),11+(I-1)
     *4+K,1)="0"ANDQ=0ANDK=3TH
     ENPRINT#DE,"0";:GOTO4150
                               :rem 208
4130 IFMID$(R$(IN(J)),11+(I-1)
     *4+K,1)="0"ANDQ=0THENPRIN
     T#DE," ";:GOTO4150:rem 19
4140 PRINT#DE,MID$(R$(IN(J)),1
     1+(I-1)*4+K,1);           :rem 147
4150 NEXTK:PRINT#DE,"
     {3 SPACES}";:GOSUB5110:NE
     XTI:PRINT#DE,"{2 SPACES}"
     MID$(R$(IN(J)),43,5)
                               :rem 212
4160 NEXTJ:PRINT#DE:PRINT#DE,"
     TOTALS{5 SPACES}";
                               :rem 188
4170 FORI=1TO8:Q=0:FORK=1TO4:I
     FMID$(TT$,(I-1)*4+K,1)<>"
     0"THENQ=1                 :rem 3
4180 IFMID$(TT$,(I-1)*4+K,1)="
     0"ANDQ=0ANDK=4THENPRINT#D
     E,"0";:GOTO4210           :rem 26
4190 IFMID$(TT$,(I-1)*4+K,1)="
     0"ANDQ=0THENPRINT#DE," ";
     :GOTO4210                 :rem 92
4200 PRINT#DE,MID$(TT$,(I-1)*4
     +K,1):                    :rem 214
4210 NEXTK:PRINT#DE,"
     {3 SPACES}";:NEXTI:PRINT#
     DE,"{2 SPACES}"MID$(TT$,3
     3,5)                      :rem 34
4220 PRINT#DE:CLOSEDE:GOTO1700
                               :rem 117
5000 OPENDE,DE:PRINT#DE:T=0:PR
     INT#DE:PRINT#DE,F$(I)" SO
     RT:":PRINT#DE             :rem 242
5010 PRINT#DE,"#{2 SPACES}PLAY
     ER{5 SPACES}"F$(I):FORJ=1
     TOPL                      :rem 123
5020 IFMID$(R$(IN(J)),4,7)="PL
     AYERX"THEN5090            :rem 4
5030 PRINT#DE,MID$(R$(IN(J)),1
     ,10)"{4 SPACES}";:rem 222
5040 Q=0:FORK=0TO3:IFMID$(R$(I
     N(J)),BB+K,1)<>"0"THENQ=1
                               :rem 166
5050 IFMID$(R$(IN(J)),BB+K,1)=
     "0"ANDQ=0ANDK=3THENPRINT#
     DE,"0":GOTO5080           :rem 60
5060 IFMID$(R$(IN(J)),BB+K,1)=
     "0"ANDQ=0THENPRINT#DE," "
     ;:GOTO50B0                :rem 186
5070 PRINT#DE,MID$(R$(IN(J)),B
     B+K,1);:IFK=3THENPRINT#DE
     ,""                       :rem 147
5080 NEXTK:T=T+VAL(MID$(R$(IN(
     J)),BB,E));GOSUB5110
                               :rem 191
5090 NEXTJ:PRINT#DE:PRINT#DE,"
     TOTAL ":F$(I);"{5 SPACES}
     ";T                       :rem 126
5100 PRINT#DE:CLOSEDE:RETURN
                               :rem 82
5110 GETA$:IFA$=""THENRETURN
                               :rem 202
5120 GETA$:IFA$=""ORA$<>"P"THE
     N5120                     :rem 199
5130 RETURN                    :rem 169
```

Program 3: Softball Statistics, IBM PC/PCjr Modifications

Version By Patrick Parrish, Programming Supervisor

Please refer to "COMPUTE!'s Guide to Typing In Programs" before entering this listing.

```
EL 90 WIDTH 80:KEY OFF:DEF SEG=0
      :PDKE 1047,PEEK(1047) OR 6
      4
JC 1920 A$=INKEY$
KI 1930 IF A$="" THEN 1920
FF 1940 IF (A$<>"Y") AND (A$<>"N
      ") THEN 1920
QO 19B0 P$=INKEY$
LF 1990 IF P$="" THEN 1980
AG 2000 IF (P$<>"S") AND (P$<>"P
      ") THEN 1980
OI 2010 DE=-(P$="S")
NJ 2030 CLS
AE 3010 ON ERRDR GOTD 3090
DM 3020 CLS:PRINT "ENTER DRIVE A
     ND DATA FILE NAME (IE.,
     B:STATS.DAT):":INPUT FF$
DA 3030 IF C=2 THEN 3070
DO 3040 DPEN FF$ FOR INPUT AS #1
     :INPUT #1,SW,SL:FOR J=1
     TD PL:INPUT #1,R$(J)
JB 3050 R$(J)=MID$(NA$(J),1,LEN(
     NA$(J)))+MID$("
      ",1,10-LEN(NA$(J)))+R$(
     J)
AC 3060 NEXT J:CLOSE #1:DN ERROR
      GOTO 0:RETURN
EK 3070 OPEN FF$ FDR DUTPUT AS #
     1:PRINT #1,W,L:FDR J=1 T
     O PL:PRINT #1,MID$(R$(J)
     ,11,32)
NO 3080 NEXT J:CLOSE #1:ON ERRDR
      GOTO 0:END
GL 3090 CLOSE #1:PRINT "DISK ERR
     DR #";ERR;"DCCURRED.":PR
     INT "TRY AGAIN."
HE 3100 PRINT:PRINT "HIT A KEY T
     O CDNTINUE"
CH 3110 A$=INKEY$:IF A$="" THEN
     3110
JN 3120 RESUME 3020
PH 4010 FG=0:ON ERROR GOTO 5140
MJ 4020 IF DE=1 THEN OPEN "SCRN:
      " FOR OUTPUT AS #1 ELSE
     OPEN "LPT1:" FOR OUTPUT
     AS #1
AD 4030 PRINT #1,:IF MM=1 THEN T
     $="THE YEAR" ELSE T$="TH
     IS GAME"
DD 4040 PRINT #1,"STATISTICS FOR
      ";T$;":";IF MM=0 THEN P
     RINT #1,TM$;" VS ";OT$;"
          SCORE:";YS;"-";TS:GO
     TO 4060
FF 4050 PRINT #1,"RECORD FOR THE
      YEAR:  WINS:";W;" LOSSE
     S:";L
JP 4060 PRINT #1,:PRINT #1,"RDST
     ER IS SORTED BY BATTING
     AVERAGE":PRINT #1,
LA 4070 PRINT #1,"#  PLAYER     A
     B   RUNS   HITS    RBI
          2B      3B      HR";
FH 40B0 PRINT #1,"      BB      A
     VG";FOR J=1 TO PL:IF MID
     $(R$(IN(J)),4,7)="PLAYER
     X" THEN 4140
JG 4090 PRINT #1,MID$(R$(IN(J)),
     1,10)" ";:FOR I=1 TO 8:B
     =0:FOR K=0 TO 3:IF MID$(
     R$(IN(J)),11+(I-1)*4+K,1
     )<>"0" THEN Q=1
```

```
DE 4100 IF MID$(R$(IN(J)),11+(I-
        1)*4+K,1)="Ø" AND Q=Ø AN
        D K=3 THEN PRINT #1,"Ø";
        :GDTD 4130
GK 4110 IF MID$(R$(IN(J)),11+(I-
        1)*4+K,1)="Ø" AND Q=Ø TH
        EN PRINT #1," ";:GDTD 41
        30
IK 4120 PRINT #1,MID$(R$(IN(J)),
        11+(I-1)*4+K,1);
QB 4130 NEXT K:PRINT #1,"   ";:G
        OSUB 5110:NEXT I:PRINT #
        1,"  "MID$(R$(IN(J)),43,
        5)
GI 4140 NEXT J:PRINT #1,:PRINT #
        1,"TOTALS     ";
EG 4150 FDR I=1 TO 8:Q=Ø:FDR K=1
         TD 4:IF MID$(TT$,(I-1)*
        4+K,1)<>"Ø" THEN Q=1
LK 4160 IF MID$(TT$,(I-1)*4+K,1)
        ="Ø" AND Q=Ø AND K=4 THE
        N PRINT #1,"Ø";:GOTD 419
        Ø
EN 4170 IF MID$(TT$,(I-1)*4+K,1)
        ="Ø" AND Q=Ø THEN PRINT
        #1," ";:GDTO 4190
DI 41B0 PRINT #1,MIO$(TT$,(I-1)*
        4+K,1);
PI 4190 NEXT K:PRINT #1,"   ";:N
        EXT I:PRINT #1,"  "MID$(
        TT$,33,5)
ML 4200 PRINT #1,:CLDSE #1:DN ER
        RDR GDTD Ø:GDTD 1700

BQ 5000 FG=1:DN ERRDR GOTO 5140
LH 5010 IF OE=1 THEN OPEN "SCRN:
        " FDR OUTPUT AS #1 ELSE
        OPEN "LPT1:" FOR OUTPUT
        AS #1
JL 5020 PRINT #1,:T=Ø:PRINT #1,:
        PRINT #1,F$(I)" SORT:";P
        RINT #1,
MG 5030 PRINT #1,"#  PLAYER
        "F$(I):FDR J=1 TO PL:IF
        MID$(R$(IN(J)),4,7)="PLA
        YERX" THEN 5090
HL 5040 PRINT #1,MIO$(R$(IN(J)),
        1,10)"    ";:Q=Ø:FDR K=Ø
         TO 3:IF MID$(R$(IN(J)),
        BB+K,1)<>"Ø" THEN Q=1
ON 5050 IF MID$(R$(IN(J)),BB+K,1
        )="Ø" AND Q=Ø AND K=3 TH
        EN PRINT #1,"Ø":GOTO 50B
        Ø
BC 5060 IF MID$(R$(IN(J)),BB+K,1
        )="Ø" AND Q=Ø THEN PRINT
         #1," ";:GDTO 5080
GN 5070 PRINT #1,MIO$(R$(IN(J)),
        BB+K,1);:IF K=3 THEN PRI
        NT #1,""
EG 50B0 NEXT K:T=T+VAL(MID$(R$(I
        N(J)),BB,E)):GOSUB 5110
KK 5090 NEXT J:PRINT #1,:PRINT #
        1,"TOTAL ";F$(I);"     "
        ;T
LI 5100 PRINT #1,:CLDSE #1:ON ER
        ROR GOTO Ø:RETURN
PK 5110 A$=INKEY$:IF A$="" THEN
        RETURN
CD 5120 A$=INKEY$:IF A$="" DR A$
        <>"P" THEN 5120
JK 5130 RETURN
HG 5140 CLOSE #1:PRINT "PRINTER
        ERROR #";ERR;"OCCURRED."
        :PRINT "TRY AGAIN."
IF 5150 PRINT:PRINT "HIT A KEY T
        O CONTINUE"
BE 5160 A$=INKEY$:IF A$="" THEN
        5160
PG 5170 IF FG=Ø THAN RESUME 4020
         ELSE RESUME 5010
```

Program 4: Softball Statistics, Apple Modifications

Version By Patrick Parrish, Programming Supervisor

Please refer to the "Apple Automatic Proofreader" article before entering this listing.

```
3B 90 D$ = CHR$ (4):I$ = CHR$ (9
   )
3C 100 D5 = 4
8D 110 D6 = 1
65 1920 GET A$
99 1930 IF A$ = "" THEN 1920
6A 1940 IF (A$ < > "Y") AND (A$
        < > "N") THEN 1920
05 1980 GET P$
81 1990 IF P$ = "" THEN 1980
C9 2000 IF (P$ < > "P") AND (P$
        < > "S") THEN 1980
4B 2010 DE = (P$ = "S")
45 2030 HDME
3E 3010 HOME
95 3020 PRINT "ENTER DATA FILE N
        AME:": INPUT FF$: DNERR
        GDTD 3100
16 3030 PRINT D$;"DPEN ";FF$: IF
         C = 2 THEN 3070
DB 3040 PRINT D$;"READ ";FF$: IN
        PUT SW,SL: FOR J = 1 TD
        PL: INPUT R$(J)
4D 3050 R$(J) = MID$ (NA$(J),1,
                LEN (NA$(J))) + MIO$ ("
                ",1,10 - LEN (N
        A$(J))) + R$(J)
48 3060 NEXT J: GOTO 30B0
9D 3070 PRINT O$;"WRITE ";FF$: P
        RINT W; CHR$ (13);L: FDR
         J = 1 TO PL: PRINT MIO$
         (R$(J),11,32): NEXT J
E3 30B0 PRINT O$;"CLOSE ";FF$: P
        DKE 216,Ø: IF C = 2 THEN
        ENO
F7 3090 RETURN
D1 3100 HDME : VTAB 5: PRINT "ER
        RDR # "; PEEK (222);" DC
        CURREO AT LINE "; PEEK (
        219) * 256 + PEEK (21B)
4C 3110 VTAB 10: PRINT "HINT: HA
        VE YDU PREVIOUSLY SAVED
        THE": PRINT "DATA FILE T
        O DISK?"
C5 3120 PRINT O$;"CLOSE ";FF$: P
        RINT : PRINT "TRY AGAIN.
        ": PRINT : PRINT "HIT AN
        Y KEY": GET A$
26 3130 IF C = 1 THEN B10
64 3140 GOTO 3010
33 4010 PRINT : IF DE = 1 THEN 4
        030
EB 4020 PRINT O$;"PR#1": PRINT I
        $;"BØN"
3F 4030 IF MM = 1 THEN T$ = "THE
        YEAR": GOTD 4050
EA 4040 T$ = "THIS GAME"
D6 4050 PRINT "STATISTICS FOR "T
        $":": IF MM = 1 THEN 407
        Ø
65 4060 PRINT TM$" VS "OT$"    S
        CORE:"YS"-"TS: GOTO 40B0
3A 4070 PRINT "RECORD FDR THE YE
        AR:  WINS:"W" LOSSES:"L
3b 40B0 PRINT : PRINT "RDSTER IS
        SDRTED BY BATTING AVERA
        GE": PRINT
F7 4090 PRINT "#  PLAYER    AB
        RUNS    HITS    RBI
        2B      3B      HR      BB
                AVG"
6C 4100 FDR J = 1 TO PL: IF MID$
         (R$(IN(J)),4,7) = "PLAY
        ERX" THEN 4160
03 4110 PRINT MID$ (R$(IN(J)),1,
        10)" ";: FDR I = 1 TD 8:
        Q = Ø: FDR K = Ø TD 3: I
        F MID$ (R$(IN(J)),11 + (
        I - 1) * 4 + K,1) < > "Ø
        " THEN Q = 1
E7 4120 IF MID$ (R$(IN(J)),11 +
        (I - 1) * 4 + K,1) = "Ø"
         AND Q = Ø AND K = 3 THE
        N PRINT "Ø";: GDTD 4150
5A 4130 IF MID$ (R$(IN(J)),11 +
        (I - 1) * 4 + K,1) = "Ø"
         AND Q = Ø THEN PRINT "
        ";: GDTD 4150
3C 4140 PRINT MID$ (R$(IN(J)),11
        + (I - 1) * 4 + K,1);
03 4150 NEXT K: PRINT "   ";: GD
        SUB 5120: NEXT I: PRINT
        "  " MID$ (R$(IN(J)),43,
        5)
B0 4160 NEXT J: PRINT : PRINT "T
        DTALS     ";
D2 4170 FDR I = 1 TD 8:Q = Ø: FO
        R K = 1 TD 4: IF MID$ (T
        T$,(I - 1) * 4 + K,1) <
        > "Ø" THEN Q = 1
D2 4180 IF MID$ (TT$,(I - 1) * 4
        + K,1) = "Ø" AND Q = Ø
        AND K = 4 THEN PRINT "Ø"
        ;: GDTD 4210
4B 4190 IF MID$ (TT$,(I - 1) * 4
        + K,1) = "Ø" AND Q = Ø
        THEN PRINT " ";: GDTD 42
        10
FF 4200 PRINT MID$ (TT$,(I - 1)
        * 4 + K,1);
6B 4210 NEXT K: PRINT "   ";: NE
        XT I: PRINT "  " MID$ (T
        T$,33,5)
E4 4220 PRINT : IF DE = Ø THEN P
        RINT O$;"PR#Ø"
6B 4230 GOTO 1700
FF 5000 PRINT : IF DE = 1 THEN 5
        020
EB 5010 PRINT D$;"PR#1": PRINT I
        $;"BØN"
1D 5020 PRINT :T = Ø: PRINT : PR
        INT F$(I)" SORT:": PRINT
A1 5030 PRINT "#  PLAYER     "F$
        (I): FDR J = 1 TO PL: IF
         MID$ (R$(IN(J)),4,7) =
        "PLAYERX" THEN 5090
39 5040 PRINT MID$ (R$(IN(J)),1,
        10)"    ";:Q = Ø: FDR K
        = Ø TO 3: IF MID$ (R$(IN
        (J)),BB + K,1) < > "Ø" T
        HEN Q = 1
CF 5050 IF MID$ (R$(IN(J)),BB +
        K,1) = "Ø" AND Q = Ø AND
         K = 3 THEN PRINT "Ø": G
        OTO 50B0
DD 5060 IF MID$ (R$(IN(J)),BB +
        K,1) = "Ø" AND Q = Ø THE
        N PRINT " ";: GOTD 50B0
6F 5070 PRINT MIO$ (R$(IN(J)),BB
        + K,1);: IF K = 3 THEN
        PRINT ""
2B 50B0 NEXT K:T = T + VAL ( MIO
        $ (R$(IN(J)),BB,E)): GOS
        UB 5120
29 5090 NEXT J: PRINT : PRINT "T
        DTAL ";F$(I);"     ";T:
        PRINT
1D 5100 IF OE = Ø THEN PRINT D$;
        "PR#Ø"
DB 5110 RETURN
3C 5120 A = PEEK ( - 163B4): IF
        A < 128 THEN 5150
FF 5130 A = PEEK ( - 163B4): IF
        A < 12B THEN POKE - 1636
        B,Ø: GOTO 5130
CB 5140 A$ = CHR$ (A - 12B): IF
        A$ < > "P" THEN 5130
EB 5150 RETURN
```

Program 5: Softball Statistics, TI-99/4A Modifications

Version By Patrick Parrish, Programming Supervisor

```
40 GOTO 100
50 CALL KEY(0,K,S)
60 IF S=0 THEN 90
70 CALL KEY(0,K,S)
80 IF (S=0)+(K<>80)THEN 70
90 RETURN
100 05=4
110 06=1
210 NA$(J)=SEG$(NA$(J),1,10
    )
240 R$(J)=SEG$(NA$(J),1,LEN
    (NA$(J)))&SEG$("
    (10 SPACES)",1,10-LEN(NA
    $(J)))
390 IF SEG$(NA$(J),4,7)<>"P
    LAYERX" THEN 420
400 R$(J)=R$(J)&"0000000000
    0000000000000000000000
    .000"
430 PRINT SEG$(NA$(J),4,LEN
    (NA$(J)));"'S STATISTIC
    S FOR THIS GAME:"
870 IF (A$="N")+(SEG$(NA$(J
    ),4,7)="PLAYERX")THEN 9
    20
880 B(I)=VAL(SES$(R$(J),11+
    (I-1)*4,4))
950 R$(J)=SEG$(R$(J),1,10)
1230 CC(J)=VAL(SEG$(R$(J),8
    8,E))
1440 S$=SEG$(C$,1,05-LEN(8$
    ))&S$
1450 R$(J)=R$(J)&S$
1490 IF SES$(AV$,1,1)<>" "
    THEN 1510
1500 AV$=SES$(AV$,2,6)
1510 IF SEG$(AV$,1,1)<>"."
    THEN 1530
1520 AV$="0"&AV$
1530 R$(J)=R$(J)&SEG$(AV$,1
    ,5)
1920 CALL KEY(0,K,S)
1930 IF S=0 THEN 1920
1935 IF (K<>78)*(K<>89)THEN
     1920
1940 A$=CHR$(K)
1950 CALL KEY(0,K,S)
1990 IF S=0 THEN 1980
2000 IF (K<>80)*(K<>83)THEN
     1950
2010 OE=-(K=80)
2030 CALL CLEAR
3010 CALL CLEAR
3020 PRINT "ENTER DATA FILE
     NAME:"
3030 INPUT FF$
3040 PRINT
3050 PRINT "OISK OR CASSETT
     E (D/C)?"
3060 CALL KEY(0,K,S)
3070 IF S=0 THEN 3060
3080 A$=CHR$(K)
3090 IF (A$<>"C")*(A$<>"D")
     THEN 3060
3100 IF A$="D" THEN 3130
3110 O$="CS1"
3120 GOTO 3140
3130 O$="OSK1."&FF$
3140 IF C=2 THEN 3240
3150 OPEN #1:D$,INTERNAL,IN
     PUT ,FIXED
3160 INPUT #1:SW
3170 INPUT #1:SL
3180 FOR J=1 TO PL
3190 INPUT #1:R$(J)
3200 R$(J)=SEG$(NA$(J),1,LE
     N(NA$(J)))&SEG$("
     (10 SPACES)",1,10-LEN(N
     A$(J)))&R$(J)
3210 NEXT J
3220 CLOSE #1
3230 RETURN
3240 OPEN #1:D$,INTERNAL,OU
     TPUT,FIXED
3250 PRINT #1:W
3260 PRINT #1:L
3270 FOR J=1 TO PL
3280 PRINT #1:SEG$(R$(J),11
     ,32)
3290 NEXT J
3300 CLOSE #1
3310 END
4010 IF OE=0 THEN 4030
4020 OPEN #DE:"RS232/2.BA=9
     600.PA=N.DA=8"
4030 PRINT #DE
4040 IF MM=1 THEN 4070
4050 D$="THIS GAME"
4060 GOTO 4080
4070 D$="THE YEAR"
4080 PRINT #DE:"STATISTICS
     FOR ";D$;":"
4090 IF MM=1 THEN 4120
4100 PRINT #DE:TM$;" VS ";O
     T$;"(4 SPACES)SCORE:";
     YS;"-";TS
4110 GOTO 4130
4120 PRINT #DE:"RECORD FOR
     THE YEAR:  WINS:";W;"
     LOSSES:";L
4130 PRINT #DE
4140 PRINT #DE:"ROSTER IS S
     ORTED BY SATTING AVERA
     GE"
4150 PRINT #DE
4160 PRINT #DE:"#  PLAYER
     (4 SPACES)AB
     (3 SPACES)RUNS
     (3 SPACES)HITS
     (4 SPACES)RSI
     (5 SPACES)2S
     (5 SPACES)3S
     (5 SPACES)HR
     (5 SPACES)SB
     (6 SPACES)AVG"
4170 FOR J=1 TO PL
4180 IF SEG$(R$(IN(J)),4,7)
     ="PLAYERX" THEN 4370
4190 PRINT #DE:SEG$(R$(IN(J
     )),1,10);" ";
4200 FOR I=1 TO 8
4210 Q=0
4220 FOR K=0 TO 3
4230 IF SEG$(R$(IN(J)),11+(
     I-1)*4+K,1)="0" THEN 4
     250
4240 Q=1
4250 IF (SEG$(R$(IN(J)),11+
     (I-1)*4+K,1)<>"0")+(Q=
     1)+(K<>3)THEN 4280
4260 PRINT #DE:"0";
4270 GOTO 4320
4280 IF (SEG$(R$(IN(J)),11+
     (I-1)*4+K,1)<>"0")+(Q=
     1)THEN 4310
4290 PRINT #DE:" ";
4300 GOTO 4320
4310 PRINT #DE:SEG$(R$(IN(J
     )),11+(I-1)*4+K,1);
4320 NEXT K
4330 PRINT #DE:"(3 SPACES)"
     ;
4340 GOSUB 50
4350 NEXT I
4360 PRINT #DE:"  ";SEG$(R$
     (IN(J)),43,5)
4370 NEXT J
4380 PRINT #DE
4390 PRINT #DE:"TOTALS
     (5 SPACES)";
4400 FOR I=1 TO 8
4410 Q=0
4420 FOR K=1 TO 4
4430 IF SEG$(TT$,(I-1)*4+K,
     1)="0" THEN 4450
4440 Q=1
4450 IF (SEG$(TT$,(I-1)*4+K
     ,1)<>"0")+(Q=1)+(K<>4)
     THEN 4480
4460 PRINT #DE:"0";
4470 GOTO 4520
4480 IF (SEG$(TT$,(I-1)*4+K
     ,1)<>"0")+(Q=1)THEN 45
     10
4490 PRINT #DE:" ";
4500 GOTO 4520
4510 PRINT #DE:SEG$(TT$,(I-
     1)*4+K,1);
4520 NEXT K
4530 PRINT #DE:"(3 SPACES)"
     ;
4540 NEXT I
4550 PRINT #DE:"  ";SEG$(TT
     $,33,5)
4560 PRINT #DE
4570 IF OE=0 THEN 1700
4580 CLOSE #DE
4590 GOTO 1700
5000 IF DE=0 THEN 5020
5010 OPEN #DE:"RS232/2.BA=9
     600.PA=N.DA=8"
5020 PRINT #DE
5030 T=0
5040 PRINT #DE
5050 PRINT #DE:F$(I);" SORT
     :"
5060 PRINT #DE
5070 PRINT #OE:"#  PLAYER
     (5 SPACES)";F$(I)
5080 FOR J=1 TO PL
5090 IF SEG$(R$(IN(J)),4,7)
     ="PLAYERX" THEN 5270
5100 PRINT #DE:SEG$(R$(IN(J
     )),1,10);"(4 SPACES)";
5110 Q=0
5120 FOR K=0 TO 3
5130 IF SEG$(R$(IN(J)),88+K
     ,1)="0" THEN 5150
5140 Q=1
5150 IF (SEG$(R$(IN(J)),88+
     K,1)<>"0")+(Q=1)+(K<>3
     )THEN 5180
5160 PRINT #DE:"0"
5170 GOTO 5240
5180 IF (SEG$(R$(IN(J)),88+
     K,1)<>"0")+(Q=1)THEN 5
     210
5190 PRINT #DE:" ";
5200 GOTO 5240
5210 PRINT #DE:SEG$(R$(IN(J
     )),88+K,1);
5220 IF K<>3 THEN 5240
5230 PRINT #DE:""
5240 NEXT K
5250 T=T+VAL(SEG$(R$(IN(J))
     ,88,E))
5260 GOSUB 50
5270 NEXT J
5280 PRINT #DE
5290 PRINT #DE:"TOTAL ";F$(
     I);"(5 SPACES)";T
5300 PRINT #DE
5310 IF DE=0 THEN 5330
5320 CLOSE #DE
5330 RETURN
```

Program 6: Softball Statistics, Atari Version

Please refer to "COMPUTE!'s Guide to Typing In Programs" before entering this listing.

```
BH 90 PL=20:OPEN #3,4,0,"K:"
NN 100 DIM B(9),CC(PL),IN(PL
+1),ST(8),RT(PL,8),TT
(PL,B),A$(12),S$(4),C
$(4),FN$(14),F$(96),P
$(1),R$((PL+1)*47)
NE 110 DIM LLABEL(B),LNAME(P
L),AV$(5),TE$(32),TM$
(25),TT$(37),OT$(25),
T$(9),OE$(2)
ND 120 TM$="TEAM NAME":FOR J
=1 TO PL:FOR I=1 TO B
:RT(J,I)=0:NEXT I:NEX
T J
OD 130 C$="0000":F$=" ":F$(9
6)=F$:F$(2)=F$:R$=" "
:R$((PL+1)*47)=R$:R$(
2)=R$
FN 140 FOR I=1 TO B:READ A$:
LLABEL(I)=LEN(A$):F$(
(I-1)*12+1,I*12)=A$:N
EXT I
ED 150 FOR J=1 TO PL:READ A$
:LNAME(J)=LEN(A$)
PD 160 R$((J-1)*47+1,(J-1)*4
7+10)=A$:NEXT J
NO 170 FOR J=1 TO PL:FOR I=1
 TO B:TT(J,I)=0:ST(I)
=0:NEXT I:NEXT J:PRIN
T "{CLEAR}GAME STATIS
TICS":PRINT "WHO OIO
YOU PLAY?"
NJ 180 INPUT OT$:PRINT "ENTE
R YOUR SCORE ANO THEI
R SCORE (SEPARATEO BY
 A COMMA)":INPUT YS,T
S:W=W+(YS>TS):L=L+(TS
>YS)
NH 190 FOR J=1 TO PL:G=0:R=J
-1
GD 200 IF R$(R*47+4,R*47+10)
="PLAYERX" THEN R$(R*
47+11,J*47)="00000000
0000000000000000000000
0000.000":GOTO 270
OG 210 PRINT "{CLEAR}";R$(R*
47+4,R*47+LNAME(J));"
'S STATISTICS FOR THI
S GAME:"
NE 220 PRINT :FOR I=1 TO B
IA 230 TRAP 230:PRINT F$((I-
1)*12+1,I*12):INPUT A
:TRAP 40000:B(I)=A:IF
 LEN(STR$(B(I)))>=4 T
HEN 230
DM 240 IF B(I)=999 THEN FOR
K=I TO B:B(K)=0:NEXT
K:I=B
HD 250 NEXT I:GOSUB 460
KL 260 FOR I=1 TO B:RT(J,I)=
RT(J,I)+B(I):TT(J,I)=
TT(J,I)+B(I):NEXT I
HK 270 NEXT J:GOSUB 580:MM=0
:FOR I=1 TO B:FOR J=1
 TO PL:ST(I)=ST(I)+TT
(J,I):NEXT J:B(I)=ST(
I):NEXT I
DH 280 GOSUB 460:TT$=R$((J-1
)*47+11,J*47):GOSUB 5
40
KG 290 PRINT :PRINT "OO YOU
 WANT TO INPUT STATS F
ROM ANOTHER GAME (Y/N
)?":GOSUB 630:IF A$="
Y" THEN 170
XF 300 PRINT "{CLEAR}WOULO Y
OU LIKE TO MERGE IN D
ATA FOR THE YEAR (Y/N
)?":GOSUB 630:IF A$="
N" THEN 320
JG 310 C=1:GOSUB 3010:W=SW+W
:L=SL+L
IB 320 GOSUB 580:FOR J=1 TO
PL:FOR I=1 TO B:IF A$
="N" OR R$((J-1)*47+4
,(J-1)*47+10)="PLAYER
X" THEN 340
JA 330 B(I)=VAL(R$((J-1)*47+
11+(I-1)*4,(J-1)*47+1
1+(I-1)*4+3)):B(I)=RT
(J,I)+B(I):RT(J,I)=B(
I):GOTO 350
GG 340 B(I)=RT(J,I)
EG 350 ST(I)=0
DI 360 NEXT I:GOSUS 460:NEXT
 J
LE 370 MM=1:FOR I=1 TO B:FOR
 J=1 TO PL:ST(I)=ST(I
)+RT(J,I):NEXT J:B(I)
=ST(I):NEXT I:GOSUB 4
60
BC 380 TT$=R$((J-1)*47+11,J*
47):PRINT "{CLEAR}OO
YOU WANT A PRINTOUT O
F THE YEAR'S STATS (Y
/N)?":GOSUS 630
AJ 390 IF A$="Y" THEN GOSUB
580:GOSUB 540
HP 400 PRINT :PRINT "OO YOU
WANT TO SAVE THE OATA
 (Y/N)?":GOSUB 630:IF
 A$="N" THEN END
MD 410 C=2:GOTO 3010
AP 420 FOR J=1 TO PL:IN(J)=J
:CC(J)=VAL(R$((J-1)*4
7+BB,(J-1)*47+BS+E-1)
):NEXT J:REM SHELL SO
RT
GN 430 FOR J=PL-1 TO 1 STEP
-1:FOR I=1 TO J:IF CC
(IN(I))>CC(IN(I+1)) T
HEN 450
MB 440 TE=IN(I):IN(I)=IN(I+1
):IN(I+1)=TE
PO 450 NEXT I:NEXT J:RETURN
OF 460 IF S(1)<>0 ANO S(3)<>
0 THEN S(9)=INT(B(3)/
B(1)*1000+0.5)/1000+1
E-04:GOTO 480:REM BUI
LO R$
DI 470 S(9)=0:AV$="0.000"
FJ 480 FOR I=1 TO B:TE$="":I
F LEN(STR$(B(I)))<4 T
HEN TE$=C$(1,4-LEN(ST
R$(B(I))))
LO 490 B$=STR$(B(I)):TE$(LEN
(TE$)+1)=B$
KD 500 R$((J-1)*47+11+(I-1)*
4,(J-1)*47+11+(I-1)*4
+3)=TE$:NEXT I:IF S(9
)=0 THEN 530
KD 510 AV$=STR$(B(9)):AV$=AV
$(1,5):IF AV$(1,1)<>"
." THEN 530
GG 520 TE$="0":TE$(2)=AV$:AV
$=TE$
JM 530 R$((J-1)*47+43,J*47)=
AV$:RETURN
JN 540 BB=43:E=5:GOSUB 420:I
F MM=1 THEN 560
MK 550 PRINT "{CLEAR}OO YOU
WANT A PRINTOUT OF TH
E GAME'S STATS (Y/N)?
":GOSUB 630
DL 560 IF A$="Y" THEN GOSUB
650:GOTO 4010
HM 570 RETURN
PK 580 PRINT :PRINT "WORKING
...":RETURN
BC 590 PRINT "OO YOU WANT SO
RTEO PRINTOUTS OF HIT
, RSI, AND RUN LEAOER
S (Y/N)?":GOSUB 630
GI 600 IF A$="N" THEN RETURN
JB 610 GOSUS 650:GOSUB 580:B
B=19:E=4:GOSUS 420:I=
3:FLAG=0:GOSUB 5000:B
B=23:GOSUS 420
JC 620 I=4:FLAG=1:GOSUS 5000
:SS=15:GOSUB 420:I=2:
FLAG=2:GOSUS 5000:RET
URN
KL 630 XX=VAL(STR$(0)):GET #
3,K:A$=CHR$(K):IF (A$
<>"Y") ANO (A$<>"N")
THEN 630
HK 640 RETURN
LN 650 PRINT :PRINT "TO SCRE
EN OR PRINTER (S/P)?"
NK 660 XX=VAL(STR$(0)):GET #
3,K:P$=CHR$(K):IF (P$
<>"S") ANO (P$<>"P")
THEN 660
BG 670 OE=(P$="S"):RETURN
KO 680 OATA TIMES AT SAT,RUN
B,HITS,RSIS,OOUBLES,T
RIPLES,HOME RUNS,WALK
S
LO 2060 REM LIST PLAYERS BY
 NUMBER & NAME
NF 2070 OATA 44 JIM,22 PETE,
03 JOHN,0B KEN,55 MI
KE
LL 20B0 OATA 06 BARRY,07 BIL
L,0S BOB,09 MARTY,10
 PLAYERX
EC 2090 OATA 11 PLAYERX,12 P
LAYERX,13 PLAYERX,14
 PLAYERX,15 PLAYERX
EK 2100 OATA 16 PLAYERX,17 P
LAYERX,1B PLAYERX,19
 PLAYERX,20 PLAYERX
HN 3000 REM INPUT/OUTPUT ROU
TINE
AM 3010 POKE 195,0:PRINT "
{CLEAR}ENTER OEVICE
AND FILENAME":PRINT
"(ie., O:STATS.OAT):
":INPUT FN$
DI 3020 TRAP 3070:IF C=2 THE
N 3050
BF 3030 OPEN #1,4,0,FN$:INPU
T #1;SW:INPUT #1;SL:
FOR J=1 TO PL:INPUT
#1;TE$
NP 3040 R$((J-1)*47+11,(J-1)
*47+42)=TE$:NEXT J:C
LOSE #1:RETURN
FJ 3050 OPEN #1,8,0,FN$:PRIN
T #1;W:PRINT #1;L:FO
R J=1 TO PL
DK 3060 PRINT #1;R$((J-1)*47
+11,(J-1)*47+42):NEX
T J:CLOSE #1:ENO
KC 3070 POKE B49,1:CLOSE #1:
TRAP 40000:IF PEEK(1
95)=0 THEN 3010
DL 30B0 PRINT :PRINT CHR$(25
3);"I ERROR ";PEEK(1
95);" I":CLOSE #1
EI 3090 IF PEEK(764)<255 THE
N POKE 764,255:GOTO
3010
MJ 3100 GOTO 3090
FL 4000 REM PRINT ROUTINE
BJ 4010 OE$="P:":IF OE=1 THE
N OE$="E:"
CO 4020 TRAP 5170:OPEN #1,8,
0,OE$
OP 4030 PRINT #1:IF MM=1 THE
```

```
   N T$="THE YEAR":GOTO
    4050
BD 4040 T$="THIS GAME"
FC 4050 PRINT #1;"STATISTICS
    FOR ";T$;":":IF MM=
   1 THEN 4070
LO 4060 PRINT #1;TM$;" VS ";
   OT$;"{4 SPACES}SCORE
   : ";YS;"-";TS:GOTO 4
   080
ED 4070 PRINT #1;"RECORD FOR
    THE YEAR:  WINS:";W
   ;" LOSSES:";L
EH 4080 PRINT #1:PRINT #1;"R
   OSTER IS SORTED BY B
   ATTING AVERAGE":PRIN
   T #1
OC 4090 PRINT #1;"#  PLAYER
   {4 SPACES}AB
   {3 SPACES}RUNS
   {3 SPACES}HITS
   {4 SPACES}RBI
   {5 SPACES}2B
   {5 SPACES}3B
   {5 SPACES}HR
   {5 SPACES}BB
   {6 SPACES}AVG"
HI 4100 FOR J=1 TO PL:IF R$(
   (IN(J)-1)*47+4,(IN(J
   )-1)*47+10)="PLAYERX
   " THEN 4180
GD 4110 PRINT #1;R$((IN(J)-1
   )*47+1,(IN(J)-1)*47+
   10);" ";
ON 4120 FOR I=1 TO B:Q=0:FOR
    K=0 TO 3
BK 4130 IF R$((IN(J)-1)*47+1
   1+(I-1)*4+K,(IN(J)-1
   )*47+11+(I-1)*4+K)<>
   "0" THEN Q=1
EI 4140 IF R$((IN(J)-1)*47+1
   1+(I-1)*4+K,(IN(J)-1
   )*47+11+(I-1)*4+K)="
   0" AND Q=0 AND K=3 T
   HEN PRINT #1;"0";:GO
   TO 4170
IL 4150 IF R$((IN(J)-1)*47+1
   1+(I-1)*4+K,(IN(J)-1
   )*47+11+(I-1)*4+K)="
   0" AND Q=0 THEN PRIN
   T #1;" ";:GOTO 4170
AJ 4160 PRINT #1;R$((IN(J)-1
   )*47+11+(I-1)*4+K,(I
   N(J)-1)*47+11+(I-1)*
   4+K);
AI 4170 NEXT K:PRINT #1;"
   {3 SPACES}";:GOSUB 5
   140:NEXT I:PRINT #1;
   " ";R$((IN(J)-1)*47
   +43,IN(J)*47)
BN 4180 NEXT J:PRINT #1:PRIN
   T #1;"TOTALS
   {5 SPACES}";
HG 4190 FOR I=1 TO B:Q=0:FOR
    K=1 TO 4:IF TT$((I-
   1)*4+K,(I-1)*4+K)<>"
   0" THEN Q=1
ON 4200 IF TT$((I-1)*4+K,(I-
   1)*4+K)="0" AND Q=0
   AND K=4 THEN PRINT #
   1;"0";:GOTO 4230
HP 4210 IF TT$((I-1)*4+K,(I-
   1)*4+K)="0" AND Q=0
   THEN PRINT #1;" ";:G
   OTO 4230
AA 4220 PRINT #1;TT$((I-1)*4
   +K,(I-1)*4+K);
AI 4230 NEXT K:PRINT #1;"
   {3 SPACES}";:NEXT I:
   PRINT #1;" ";TT$(33
   ,37):PRINT #1:CLOSE
   #1:GOTO 590
FD 5000 IF FLAG=0 THEN OE$="
   P:":IF OE=1 THEN OE$
   ="E:"
GJ 5010 TRAP 5180:IF FLAG=0
   THEN OPEN #1,8,0,OE$
OO 5020 PRINT #1:T=0:PRINT #
   1:PRINT #1;F$((I-1)*
   12+1,(I-1)*12+LLABEL
   (I));" SORT:":PRINT
   #1
CJ 5030 PRINT #1;"#  PLAYER
   {5 SPACES}";F$((I-1)
   *12+1,(I-1)*12+LLABE
   L(I)):FOR J=1 TO PL
LO 5040 IF R$((IN(J)-1)*47+4
   ,(IN(J)-1)*47+10)="P
   LAYERX" THEN 5110
GN 5050 PRINT #1;R$((IN(J)-1
   )*47+1,(IN(J)-1)*47+
   10);"{4 SPACES}";
AG 5060 Q=0:FOR K=0 TO 3:IF
   R$((IN(J)-1)*47+BB+K
   ,(IN(J)-1)*47+BB+K)<
   >"0" THEN Q=1
EN 5070 IF R$((IN(J)-1)*47+B
   B+K,(IN(J)-1)*47+BB+
   K)="0" AND Q=0 AND K
   =3 THEN PRINT #1;"0"
   :GOTO 5100
NK 5080 IF R$((IN(J)-1)*47+B
   B+K,(IN(J)-1)*47+BB+
   K)="0" AND Q=0 THEN
   PRINT #1;" ";:GOTO 5
   100
GB 5090 PRINT #1;R$((IN(J)-1
   )*47+BB+K,(IN(J)-1)*
   47+BB+K);:IF K=3 THE
   N PRINT #1;""
FH 5100 NEXT K:T=T+VAL(R$((I
   N(J)-1)*47+BB,(IN(J)
   -1)*47+BB+E-1)):GOSU
   B 5140
JA 5110 NEXT J:PRINT #1:PRIN
   T #1;"TOTAL ";F$((I-
   1)*12+1,(I-1)*12+LLA
   BEL(I));"{6 SPACES}"
   ;T
JK 5120 IF FLAG=2 THEN CLOSE
    #1:FLAG=0
KJ 5130 RETURN
GF 5140 K=PEEK(764):IF K=255
    THEN RETURN
CH 5150 GET #3,K:A$=CHR$(K):
   IF A$<>"P" THEN 5150
KN 5160 RETURN
FF 5170 GOSUB 5190:GOTO 4020
FG 5180 GOSUB 5190:GOTO 5010
HC 5190 CLOSE #1:TRAP 40000:
   PRINT "TURN ON YOUR
   PRINTER--PRESS RETUR
   N":INPUT A$:RETURN
```
©

Fast Filer

Richard Mansfield, Senior Editor, and Patrick Parrish, Programming Supervisor

Maintain a master index of magazine articles with this short BASIC program for the Commodore 64, 128, VIC-20, Plus/4, 16, PET, Atari, Apple II series, IBM PC/PCjr, and TI-99/4A. With slight modifications, the Commodore version can work on any computer with Microsoft BASIC.

How many times have you been working on a program when you recall a magazine article that has just the information you need—but finding it is another matter? That is, you know the article's *somewhere* in the house—but where? You could spend hours paging through back issues to find what you're looking for. Now, with "Fast Filer," you'll have a fast and easy way to retrieve such information.

Enter and save Fast Filer from one of the listings below. Program 1 works on any Commodore computer, including the PET/CBM, VIC-20, 64, Plus/4, 16, and the new Commodore 128 (in 64 mode or 128 mode). Program 2 is the Atari version. Enter Program 3 for Apple, Program 4 for the IBM PC/PCjr, or Program 5 for the TI-99/4A.

If you type in one of the non-Commodore versions, *be sure to add lines 1999–2050 from Program 1.* (TI users should also note line 100, which configures your system for printer output. Check your printer manual and change this line as needed to set up your particular printer.) The program should be easy to convert for other computers (such as the TRS-80) that use Microsoft BASIC. The only lines you need to change are those that involve screen formatting and printer output; consult your user's manual for the proper commands to clear the screen and so on.

Searching The Database

Fast Filer is designed for simplicity and convenience. To search the database, all you really need to do is type RUN and follow the prompts. The program first asks whether you want to send output to the screen or the printer. Then the menu displays several options. You can search the database in several different ways: by magazine title, by author, by subject, by publication date, or by two categories at once.

For example, say you want to list all articles from COMPUTE!. Simply choose option 1 and enter COMPUTE! when prompted for the magazine name. To list all articles by Charles Brannon, choose option 2 and enter BRANNON in response to the author prompt. Once the listing begins, you can pause it by pressing any key, and resume by pressing P.

Fast Filer accepts abbreviations, so it's usually not necessary to type in the entire name. You can abbreviate COMPUTE! as COMPU, for example. However, you must give Fast Filer enough information to distinguish similar names. If the database contains articles by Butterfield and Buncombe, entering BU for the author lists all articles by *both* authors, since both names share those two characters. Entering BUT would distinguish the two names and list all Butterfield articles.

For added flexibility, options 5 and 6 let you search by more than one category at a time. Option 5 provides an *AND* function to find articles that *share* two categories. For instance, to find all COMPUTE! articles written by Charles Brannon, select option 5 and enter 1,2 (be sure to separate the numbers with a comma). Then enter the magazine and author names as prompted.

Option 6 provides an *OR* function to find articles in *either* of two

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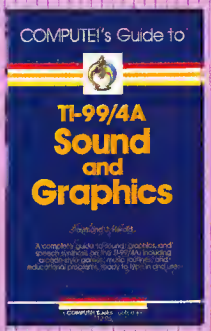

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Raymond J. Herold

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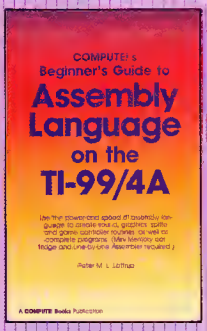

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categories. For instance, perhaps you're interested in machine language. With option 6 you could find every article that was categorized under the subject MACHINE LANGUAGE, *or* that was written by Jim Butterfield (who often writes on that subject). The ability to search two categories simultaneously is very powerful.

Easy Data Entry

Of course, no database is useful until it contains some data. Line 1999 of Fast Filer is a template that shows the format for entering data. To enter new data, simply add new lines to Fast Filer, using line numbers higher than 1999. (Lines 2000–2040 are examples which you can modify or delete.)

Every new entry must be in the form of a BASIC line consisting of a line number and a DATA statement, followed by six data items separated by commas. Here is the format:

```
MAGAZINE TITLE, AUTHOR,
SUBJECT, DATE, PAGE NUMBER,
COMMENTS
```

Because Fast Filer separates data items with commas, you must not put commas within the data itself. For instance, enter BRANNON C for an author's name, not BRANNON, C.

You cannot omit any of the data items for a particular entry; if you do, the entire list of data is thrown out of sequence. Instead of leaving a particular item blank, substitute something like N/A (for not applicable). For example, you might have an entry for which you don't feel the need to add a comment, like:

```
2000 COMPUTE!,READERS FEED-
BACK,LOWERCASE FOR TI,
4/85,22,N/A
```

Pay particular attention to line 2050, which tells Fast Filer it has reached the end of the data. This must *always* be the last DATA line in the program. When adding new data, renumber this line accordingly. When you're done adding data, resave Fast Filer on disk or tape. The next time you run it, all the new data is available. Since the data is appended to the program itself, the size of the database is limited only by your computer's memory.

Designing A Database

Fast Filer provides the basic framework for a database, but for maximum flexibility, it leaves the most important design choices up to you. You are free to choose whatever subject categories you like, making them as general or as specific as your needs require.

Creating categories deserves some careful forethought. Clearly, a subject category like COMPUTERS is too broad to be useful. On the other hand, the subject must have enough breadth to encompass more than one article. Consistency is essential, too. If you pick MACHINE LANGUAGE as a subject, then stick with that subject name; categorizing other machine language articles under subject names like ML or MACH LANG will result in incomplete searches.

Before adding your first entry, you may want to decide on standard names for your major categories. These could be saved for future reference in a written list or added to Fast Filer as REM statements.

Use consistent names for magazine titles and authors as well. If you enter a magazine title as COMPUTE (without the exclamation point), it won't be found when you search for articles under the key word COMPUTE! (although the reverse would work). Likewise, GAZETTE is a more convenient title than COMPUTE!'S GAZETTE.

Fast Filer's ability to abbreviate can work to your advantage. For instance, say that you pick GRAPHICS as a major category. If you enter graphics articles under subject names like GRAPHICS VIC, GRAPHICS C64, GRAPHICS PET, and so on, then Fast Filer can find *all* graphics articles (under the subject GRAPHICS) as well as graphics articles for a particular computer.

There are limits to what Fast Filer can do, of course, as there are with any BASIC program this brief. But its simplicity makes the program easier to customize. One of the best ways to learn programming is to begin with an existing program and alter it to fit your own needs. Such changes can range from the purely cosmetic (changing screen or character colors) to more significant improvements (formatting printer output, adding extra categories, etc.). In fact, with only a few modifications, Fast Filer can be used to index practically anything, from books or record albums to investments, rare coins, or stamps.

Program 1: Commodore Fast Filer

Please refer to "COMPUTE!'s Guide to Typing In Programs" before entering this listing.

```
10 DIMA$(6):G$="{7 RIGHT}":REM
   FOR VIC, SET G$="" :rem 3
20 PRINT"{CLR}{10 DOWN}"G$"PRI
   NT TO {RVS}S{OFF}CREEN OR
   {RVS}P{OFF}RINTER ?":rem 91
30 GETK$:IFK$=""OR(K$<>"P"ANDK
   $<>"S")THEN30 :rem 191
40 DE=-(K$="P")*4-(K$="S")*3:O
   PENDE,DE :rem 14
50 LABEL$(1)="MAGAZINE TITLE:"
   :LABEL$(2)="AUTHOR'S LAST N
   AME:" :rem 146
60 LABEL$(3)="THE TARGET SUBJE
   CT:":LABEL$(4)="DATE (IE.,
   {SPACE}1/14/85 OR 1/85):"
   :rem 5
70 PRINT"{CLR}{5 DOWN}"G$"CHOO
   SE ONE (1-8):":PRINTG$"
   {DOWN}{RIGHT}1. MAGAZINE"
   :rem 226
80 PRINTG$"{RIGHT}2. AUTHOR":P
   RINTG$"{RIGHT}3. SUBJECT":P
   RINTG$"{RIGHT}4. DATE"
   :rem 11
90 PRINTG$"{RIGHT}5. AND":PRIN
   TG$"{RIGHT}6. OR":PRINTG$"
   {RIGHT}7. PRINT ALL":PRINTG
   $"{RIGHT}8. QUIT{DOWN}"
   :rem 59
100 GETK$:IFK$=""OR(VAL(K$)<1O
    RVAL(K$)>8)THEN100 :rem 21
110 K=VAL(K$):ONKGOTO120,130,1
    40,150,160,160,300,340
   :rem 246
120 C=1:GOTO350 :rem 79
130 C=2:GOTO350 :rem 81
140 C=3:GOTO350 :rem 83
150 C=4:GOTO350 :rem 85
160 H$="OR":IFK=5THENH$="AND"
   :rem 154
170 PRINTG$"# "H$" # (1-4):":P
    RINTG$;:INPUTN1,N2 :rem 73
180 IF(N1<1ORN1>4)OR(N2<1ORN2>
    4)THEN170 :rem 48
190 PRINT"{CLR}TYPE "LABEL$(N1
    ):INPUTI1$:L=LEN(I1$)
   :rem 141
200 PRINT"{DOWN}TYPE "LABEL$(N
    2):INPUTI2$:L2=LEN(I2$)
   :rem 56
210 PRINT:Q=0:F=0:RESTORE
   :rem 99
220 GOSUB450:IFF=1THEN410
   :rem 238
230 IFK=6THEN260 :rem 169
240 IFLEFT$(A$(N1),L)<>I1$ORLE
    FT$(A$(N2),L2)<>I2$THEN280
   :rem 141
250 GOTO270 :rem 105
260 IFLEFT$(A$(N1),L)<>I1$ANDL
    EFT$(A$(N2),L2)<>I2$THEN28
    0 :rem 193
270 Q=1:GOSUB470 :rem 173
280 IFF=0THEN220 :rem 159
290 GOTO410 :rem 105
300 PRINT"{CLR}":F=0:RESTORE
   :rem 66
310 GOSUB450:IFF=1THEN420
   :rem 239
```

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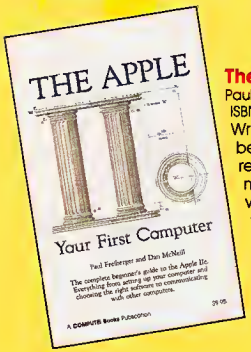

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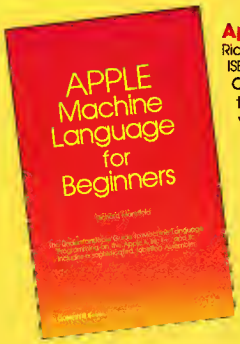

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```
320 GOSUB8470:IFF=0THEN310
                          :rem 239
330 GOTO420               :rem 101
340 CLOSEDE:END           :rem 167
350 PRINT"{CLR}TYPE "LABEL$(C)
    :INPUTINP$:L=LEN(INP$)
                          :rem 41
360 PRINT:Q=0:F=0:RESTORE
                          :rem 105
370 GOSUB450:IFF=1THEN410
                          :rem 244
380 IFLEFT$(A$(C),L)<>INP$THEN
    400                   :rem 131
390 Q=1:GOSUB470          :rem 176
400 IFF=0THEN370          :rem 159
410 IFQ=0THENPRINTG$"{DOWN}
    {RVS}NO MATCHES FOUND{OFF}
    {DOWN}"               :rem 49
420 PRINTG$"{RVS}PRESS ANY KEY
    {OFF}"                :rem 212
430 GETA$:IFA$=""THEN430
                          :rem 81
440 GOTO70                :rem 56
450 READA$(1),A$(2),A$(3),A$(4
    ),A$(5),A$(6):IFA$(1)="END
    "THENF=1              :rem 245
460 RETURN                :rem 122
470 PRINT#DE,A$(1)"{3 SPACES}"
    A$(2)"{3 SPACES}"A$(3)"
    {3 SPACES}"A$(4)"
    {3 SPACES}P. "A$(5)"
    {3 SPACES}"A$(6)      :rem 75
480 PRINT#DE              :rem 213
490 GETA$:IFA$=""THENRETURN
                          :rem 160
500 GETA$:IFA$=""ORA$<>"P"THEN
    500                   :rem 97
510 RETURN                :rem 118
1999 REM DATA TEMPLATE: MAGAZI
    NE,AUTHOR,SUBJECT,DATE,PA
    GE,COMMENTS           :rem 28
2000 DATA COMPUTE!,SCHULTZ N,M
    INDBUSTERS,4/85,44,GAME
                          :rem 19
2010 DATA GAZETTE,BRANNON C,HO
    RIZONS,1/85,80,VIC TO 64
                          :rem 190
2020 DATA GAZETTE,RANDALL N,RO
    AD TO MOSCOW,12/84,80,GAM
    E REVIEW              :rem 13
2030 DATA COMPUTE!,WATSON D,AP
    PLE SCREEN DUMP,10/84,169
    ,TEXT SCREEN          :rem 34
2040 DATA COMPUTE!,KEES M,SUPE
    RBASIC 64,10/83,198,ADDS
    {SPACE}35 COMMANDS TO 8AS
    IC                    :rem 66
2050 DATA END,0,0,0,0,0,0
                          :rem 132
```

Program 2: Atari Fast Filer

Version by Patrick Parrish, Programming Supervisor

Please refer to "COMPUTE!'s Guide to Typing In Programs" before entering this listing.

```
JI 10 OPEN #1,4,0,"K:"
CO 20 DIM A$(180),B$(30),OE$
      (2),G$(10),H$(3),I1$(3
      0),I2$(30),LABEL$(112)
      ,L(6)
IG 30 G$="{10 SPACES}":A$=" "
      :A$(180)=A$:A$(2)=A$:L
      ABEL$(112)=A$:LABEL$(2
      )=A$
FP 40 LABEL$="Magazine title
      :{13 SPACES}Author's la
      st name:{9 SPACES}The
      target subject:
      {8 SPACES}"
CI 50 LABEL$(85,112)="Date (
      ie., 1/14/85 or 1/85):
      "
EL 60 GRAPHICS 0:POKE 752,1
IG 70 PRINT "{CLEAR}":POSITI
      ON 6,10:PRINT "Print t
      o Screen or Printer ?"
IF 80 GET #1,A:IF A<>80 AND
      A<>83 THEN 80
PH 90 OE=(A=83):OE$="P:":IF
      DE=1 THEN OE$="E:"
LO 100 TRAP 570:OPEN #2,8,0,
      OE$
DP 110 PRINT "{CLEAR}{6 DOWN}
      ":POKE 752,1:PRINT G$
      ;"Choose one (1-8):":
      PRINT "{DOWN}";G$;" 1
      . Magazine"
FA 120 PRINT G$;" 2. Author"
      :PRINT G$;" 3. Subjec
      t":PRINT G$;" 4. Date
      "
GN 130 PRINT G$;" 5. And":PR
      INT G$;" 6. Or":PRINT
       G$;" 7. Print all":P
      RINT G$;" 8. Quit"
FG 140 GET #1,K:IF K<49 OR K
      >56 THEN 140
EJ 150 K=K-48:ON K GOTO 160,
      170,180,190,200,200,3
      40,380
FH 160 C=1:GOTO 390
FJ 170 C=2:GOTO 390
FL 180 C=3:GOTO 390
FN 190 C=4:GOTO 390
DF 200 H$="or":IF K=5 THEN H
      $="and"
BP 210 PRINT :PRINT G$;"# ";
      H$;" # (1-4):":PRINT
      G$;:POKE 752,0:INPUT
      N1,N2
CG 220 IF (N1<1 OR N1>4) OR
      (N2<1 OR N2>4) THEN 2
      10
PG 230 PRINT "{CLEAR}":PRINT
       "Type ";LABEL$((N1-1
      )*28+1,N1*28):INPUT I
      1$:L=LEN(I1$)
CB 240 PRINT "{DOWN}Type ";L
      ABEL$((N2-1)*28+1,N2*
      28):INPUT I2$:L2=LEN(
      I2$):POKE 752,1
GH 250 PRINT :Q=0:F=0:RESTOR
      E
PK 260 GOSUB 490:IF F=1 THEN
       450
KI 270 IF K=6 THEN 300
EJ 280 IF A$((N1-1)*30+1,(N1
      -1)*30+L)<>I1$ OR A$(
      (N2-1)*30+1,(N2-1)*30
      +L2)<>I2$ THEN 320
BI 290 GOTO 310
NE 300 IF A$((N1-1)*30+1,(N1
      -1)*30+L)<>I1$ AND A$
      ((N2-1)*30+1,(N2-1)*3
      0+L2)<>I2$ THEN 320
KE 310 Q=1:GOSUB 520
JO 320 IF F=0 THEN 260
GI 330 GOTO 450
DA 340 PRINT "{CLEAR}":F=0:R
      ESTORE
PL 350 GOSUB 490:IF F=1 THEN
       460
PD 360 GOSUB 520:IF F=0 THEN
       350
GN 370 GOTO 460
NK 380 CLOSE #2:POKE 752,0:E
      ND
EM 390 PRINT "{CLEAR}":PRINT
       "Type ";LABEL$((C-1)
      *28+1,C*28):POKE 752,
      0:INPUT I1$:L=LEN(I1$
      ):POKE 752,1
GE 400 PRINT :Q=0:F=0:RESTOR
      E
PN 410 GOSUB 490:IF F=1 THEN
       450
LH 420 IF A$((C-1)*30+1,(C-1
      )*30+L)<>I1$ THEN 440
KH 430 Q=1:GOSUB 520
JD 440 IF F=0 THEN 410
HB 450 IF Q=0 THEN PRINT :PR
      INT G$;"NO MATCHES FOU
      ND"
LG 460 PRINT :PRINT G$;"PRES
      S ANY KEY"
PB 470 K=PEEK(764):IF K=255
      THEN 470
GH 480 GOTO 110
DJ 490 FOR I=1 TO 6:READ 8$:
      IF 8$="END" THEN I=6:
      F=1:GOTO 510
ME 500 L(I)=LEN(8$):A$((I-1)
      *30+1,I*30)=8$
DI 510 NEXT I:RETURN
GE 520 FOR I=1 TO 6:PRINT #2
      ;A$((I-1)*30+1,(I-1)*
      30+L(I));"{3 SPACES}"
      ;:IF I=4 THEN PRINT #
      2;"p. ";
FI 530 NEXT I:PRINT #2:PRINT
       #2
CA 540 A=PEEK(764):IF A=255
      THEN RETURN
KP 550 GET #1,A:A$=CHR$(A):I
      F A$<>"P" THEN 550
NL 560 RETURN
CC 570 CLOSE #2:TRAP 40000:P
      RINT "{DOWN}Turn on y
      our printer--press RE
      TURN";:INPUT A$:GOTO
      100
```

Program 3: Apple Fast Filer

Version by Patrick Parrish, Programming Supervisor

Please refer to the "Apple Automatic Proofreader" article elsewhere in this issue.

```
56 10 O$ = CHR$ (4):I$ = CHR$ (9
      ): DIM A$(6):G$ = "
                "
9F 20 HOME : VTAB 10: HTAB 4: PR
      INT "PRINT TO SCREEN OR PR
      INTER (S/P)?"
C3 30 A = PEEK ( - 16384): IF A
      < 128 THEN 30
BA 40 K$ = CHR$ (A - 128): POKE
      - 16368,0: IF K$ < > "P" A
      ND K$ < > "S" THEN 30
7A 50 OE = (K$ = "S"):LABEL$(1)
      = "MAGAZINE TITLE:":LABEL$
      (2) = "AUTHOR'S LAST NAME:
      "
6D 60 LABEL$(3) = "THE TARGET SU
      BJECT:":LABEL$(4) = "DATE
      (IE., 1/14/85 OR 1/85):"
43 70 HOME : VTAB 6: PRINT G$"CH
      OOSE ONE (1-8):": PRINT :
      PRINT G$" 1. MAGAZINE"
6B 80 PRINT G$" 2. AUTHOR": PRIN
      T G$" 3. SUBJECT": PRINT G
      $" 4. DATE"
FF 90 PRINT G$" 5. AND": PRINT G
      $" 6. OR": PRINT G$" 7. PR
      INT ALL": PRINT G$" 8. QUI
      T"
4B 100 A = PEEK ( - 16384): IF A
       < 128 THEN 100
B9 110 K$ = CHR$ (A - 128): POKE
       - 16368,0: IF VAL (K$) <
      1 OR VAL (K$) > 8 THEN 1
      00
```

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```
#7 120 K = VAL (K$): ON K GOTO 1
       30,140,150,160,170,170,31
       0,360
B6 130 C = 1: GOTO 370
AB 140 C = 2: GOTO 370
CA 150 C = 3: GOTO 370
EC 160 C = 4: GOTO 370
9B 170 H$ = "OR": IF K = 5 THEN
       H$ = "ANO"
AA 180 PRINT : PRINT G$"# "H$" #
       (1-4):": PRINT G$;: INPU
       T N1,N2
EB 190 IF (N1 < 1 OR N1 > 4) OR
       (N2 < 1 OR N2 > 4) THEN 1
       80
92 200 HOME : PRINT "TYPE "LABEL
       $(N1): INPUT I1$:L = LEN
       (I1$)
37 210 PRINT : PRINT "TYPE "LABE
       L$(N2): INPUT I2$:L2 = LE
       N (I2$)
BE 220 PRINT :Q = 0:F = 0: RESTO
       RE : IF OE = 0 THEN PRINT
        O$;"PR#1": PRINT I$;"80N
       "
A3 230 GOSUB 480: IF F = 1 THEN
       430
2B 240 IF K = 6 THEN 270
57 250 IF LEFT$ (A$(N1),L) < > I
       1$ OR LEFT$ (A$(N2),L2) <
       > I2$ THEN 290
2B 260 GOTO 280
E5 270 IF LEFT$ (A$(N1),L) < > I
       1$ AND LEFT$ (A$(N2),L2)
       < > I2$ THEN 290
9C 280 Q = 1: GOSUB 500
86 290 IF F = 0 THEN 230
11 300 GOTO 430
B6 310 HOME :F = 0: RESTORE : IF
       OE = 0 THEN PRINT O$;"PR
       #1": PRINT I$;"80N"
C2 320 GOSUB 480: IF F = 1 THEN
       340
34 330 GOSUB 500: IF F = 0 THEN
       320
BD 340 IF OE = 0 THEN PRINT O$;"
       PR#0"
1D 350 GOTO 450
97 360 END
#7 370 HOME : PRINT "TYPE "LABEL
       $(C): INPUT INP$:L = LEN
       (INP$)
9B 380 PRINT :Q = 0:F = 0: RESTO
       RE : IF OE = 0 THEN PRINT
        O$;"PR#1": PRINT I$;"80N
       "
B8 390 GOSUB 480: IF F = 1 THEN
       430
32 400 IF LEFT$ (A$(C),L) < > IN
       P$ THEN 420
9B 410 Q = 1: GOSUB 500
CA 420 IF F = 0 THEN 390
BC 430 IF OE = 0 THEN PRINT O$;"
       PR#0"
85 440 IF Q = 0 THEN PRINT : PRI
       NT G$;: INVERSE : PRINT "
       NO MATCHES FOUND": NORMAL
15 450 PRINT : PRINT G$;: INVERS
       E : PRINT "PRESS ANY KEY"
       : NORMAL : POKE - 16368,0
3C 460 A = PEEK ( - 16384): IF A
       < 128 THEN 460
45 470 POKE - 16368,0: GOTO 70
7B 480 READ A$(1),A$(2),A$(3),A$
       (4),A$(5),A$(6): IF A$(1)
       = "ENO" THEN F = 1
26 490 RETURN
3E 500 PRINT A$(1)"   "A$(2)"
       "A$(3)"   "A$(4)"   P. "A
       $(5)"   "A$(6): PRINT
83 510 A = PEEK ( - 16384): IF A
       < 128 THEN RETURN
54 520 A = PEEK ( - 16384): IF A
       < 128 THEN 520
54 530 A$ = CHR$ (A - 128): POKE
       - 16368,0: IF A$ < > "P"
       THEN 520
1D 540 RETURN
```

Program 4: IBM PC/PCjr Fast Filer

Version by Patrick Parrish, Programming Supervisor

Please refer to "COMPUTE!'s Guide to Typing In Programs" before entering this listing.

```
IO 10 WIOTH 40:KEY OFF:DEF SEG=0
      :POKE 1047,PEEK(1047) OR 6
      4:DIM A$(6):G$=""
NL 20 CLS:LOCATE 10,3,0:PRINT "P
      RINT TO SCREEN OR PRINTER
      (S/P)?"
KB 30 K$=INKEY$:IF K$="" OR (K$<
      >"P" AND K$<>"S") THEN 30
GI 40 OE=-(K$="S"):IF OE=1 THEN
      OPEN "SCRN:" FOR OUTPUT AS
       #1 ELSE OPEN "LPT1:" FOR
      OUTPUT AS #1
CM 50 LABEL$(1)="MAGAZINE TITLE:
      ":LABEL$(2)="AUTHOR'S LAST
      NAME:"
DJ 60 LABEL$(3)="THE TARGET SUBJ
      ECT:":LABEL$(4)="DATE (IE.
      , 1/14/85 OR 1/85):"
OL 70 CLS:PRINT STRING$(6,31)G$"
      CHOOSE ONE (1-8):":PRINT:P
      RINT G$" 1. MAGAZINE"
JP 80 PRINT G$" 2. AUTHOR":PRINT
       G$" 3. SUBJECT":PRINT G$"
      4. DATE"
PB 90 PRINT G$" 5. AND":PRINT G$
      " 6. OR":PRINT G$" 7. PRIN
      T ALL":PRINT G$" 8. QUIT"
LP 100 K$=INKEY$:IF K$="" OR (VA
      L(K$)<1 OR VAL(K$)>8) THE
      N 100
PE 110 K=VAL(K$):ON K GOTO 120,1
      30,140,150,160,160,290,32
      0
NF 120 C=1:GOTO 330
OO 130 C=2:GOTO 330
OH 140 C=3:GOTO 330
PA 150 C=4:GOTO 330
FN 160 H$="OR":IF K=5 THEN H$="A
      ND"
KB 170 PRINT:PRINT G$"# "H$" # (
      1-4):":PRINT G$;:INPUT N1
      ,N2
MB 180 IF (N1<1 OR N1>4) OR (N2<
      1 OR N2>4) THEN 170
GI 190 CLS:PRINT "TYPE "LABEL$(N
      1):INPUT I1$:L=LEN(I1$)
EE 200 PRINT:PRINT "TYPE "LABEL$
      (N2):INPUT I2$:L2=LEN(I2$
      )
PP 210 PRINT:Q=0:F=0:RESTORE
FD 220 GOSUB 420:IF F=1 THEN 390
CO 230 IF K=6 THEN 250
PI 240 IF LEFT$(A$(N1),L)<>I1$ O
      R LEFT$(A$(N2),L2)<>I2$ T
      HEN 270 ELSE 260
PL 250 IF LEFT$(A$(N1),L)<>I1$ A
      ND LEFT$(A$(N2),L2)<>I2$
      THEN 270
JA 260 Q=1:GOSUB 440
JM 270 IF F=0 THEN 220
IE 280 GOTO 390
LP 290 CLS:F=0:RESTORE
HP 300 GOSUB 420:IF F=1 THEN 400
JC 310 GOSUB 440:IF F=0 THEN 300
      ELSE 400
ID 320 CLOSE #1:END
AH 330 CLS:PRINT "TYPE "LABEL$(C
      ):INPUT IN$:L=LEN(IN$)
PG 340 PRINT:Q=0:F=0:RESTORE
GK 350 GOSUB 420:IF F=1 THEN 390
EI 360 IF LEFT$(A$(C),L)<>IN$ TH
      EN 380
JD 370 Q=1:GOSUB 440
NG 380 IF F=0 THEN 350
EL 390 IF Q=0 THEN PRINT:PRINT G
      $;:COLOR 0,7:PRINT"NO MAT
      CHES FOUND":COLOR 7,0:PRI
      NT
IH 400 PRINT " "G$;:COLOR 0,7:PR
      INT "PRESS ANY KEY":COLOR
       7,0
CO 410 A$=INKEY$:IF A$="" THEN 4
      10 ELSE 70
AG 420 READ A$(1),A$(2),A$(3),A$
      (4),A$(5),A$(6):IF A$(1)=
      "ENO" THEN F=1
ME 430 RETURN
OM 440 PRINT #1,A$(1)"   "A$(2)"
         "A$(3)"   "A$(4)"   P.
       "A$(5)"   "A$(6):PRINT #
      1,
LK 450 A$=INKEY$:IF A$="" THEN R
      ETURN
OC 460 A$=INKEY$:IF A$="" OR A$<
      >"P" THEN 460
NM 470 RETURN
```

Program 5: TI Fast Filer

Version by Patrick Parrish, Programming Supervisor

```
10 DIM A$(6)
20 G$="{5 SPACES}"
30 CALL CLEAR
40 PRINT "PRINT TO SCREEN O
   R PRINTER (S/P)?"
50 CALL KEY(0,K,S)
60 IF S=0 THEN 50
70 IF (K<>80)*(K<>83)THEN 5
   0
80 OE=-(K=80)
90 IF OE=0 THEN 110
100 OPEN #OE:"RS232/2.BA=96
   00.DA=8.PA=N"
110 LABEL$(1)="MAGAZINE TIT
   LE:"
120 LABEL$(2)="AUTHOR'S LAS
   T NAME:"
130 LABEL$(3)="THE TARGET S
   UBJECT:"
140 LABEL$(4)="DATE (IE., 1
   /14/85 OR 1/85):"
150 CALL CLEAR
160 PRINT
170 PRINT G$;"CHOOSE ONE (1
   -8):"::
180 PRINT G$;" 1. MAGAZINE"
190 PRINT G$;" 2. AUTHOR"
200 PRINT G$;" 3. SUBJECT"
210 PRINT G$;" 4. DATE"
220 PRINT G$;" 5. AND"
230 PRINT G$;" 6. OR"
240 PRINT G$;" 7. PRINT ALL
   "
250 PRINT G$;" 8. QUIT"::::
   ::::
260 CALL KEY(0,K,S)
270 IF S=0 THEN 260
280 IF (K<49)+(K>56)THEN 26
   0
290 K=K-48
300 ON K GOTO 310,330,350,3
   70,390,390,680,760
310 C=1
320 GOTO 790
330 C=2
```

```
340 GOTO 790
350 C=3
360 GOTO 790
370 C=4
380 GOTO 790
390 H$="OR"
400 IF K<>5 THEN 420
410 H$="AND"
420 PRINT G$;"# ";H$;" # (1-4):"
430 PRINT G$;
440 INPUT N1,N2
450 IF ((N1<1)+(N1>4))+((N2<1)+(N2>4))THEN
    420
460 CALL CLEAR
470 PRINT "TYPE ";LABEL$(N1)
480 INPUT I1$
490 L=LEN(I1$)
500 PRINT
510 PRINT "TYPE ";LABEL$(N2)
520 INPUT I2$
530 L2=LEN(I2$)
540 Q=0
550 PRINT
560 F=0
570 RESTORE
580 GOSUB 1010
590 IF F=1 THEN 930
600 IF K=6 THEN 630
610 IF (SEG$(A$(N1),1,L)<>I1$)+(SEG$(A$(N2
    ),1,L2)<>I2$)THEN 660
620 GOTO 640
630 IF (SEG$(A$(N1),1,L)<>I1$)*(SEG$(A$(N2
    ),1,L2)<>I2$)THEN 660
640 Q=1
650 GOSUB 1050
660 IF F=0 THEN 580
670 GOTO 930
680 CALL CLEAR
690 F=0
700 RESTORE
710 GOSUB 1010
720 IF F=1 THEN 960
730 GOSUB 1050
740 IF F=0 THEN 710
750 GOTO 960
760 IF OE=0 THEN 780
770 CLOSE #OE
780 END
790 CALL CLEAR
800 PRINT "TYPE ";LABEL$(C)
810 INPUT INP$
820 L=LEN(INP$)
830 Q=0
840 PRINT
850 F=0
860 RESTORE
870 GOSUB 1010
880 IF F=1 THEN 930
890 IF SEG$(A$(C),1,L)<>INP$ THEN 920
900 Q=1
910 GOSUB 1050
920 IF F=0 THEN 870
930 IF Q=1 THEN 960
940 PRINT
950 PRINT G$;"NO MATCHES FOUND"
960 PRINT
970 PRINT G$;" PRESS ANY KEY"
980 CALL KEY(0,O,S)
990 IF S=0 THEN 980
1000 GOTO 150
1010 READ A$(1),A$(2),A$(3),A$(4),A$(5),A$
     (6)
1020 IF A$(1)<>"END" THEN 1040
1030 F=1
1040 RETURN
1050 PRINT #OE:A$(1);"(3 SPACES)";A$(2);"
     (3 SPACES)";A$(3);"(3 SPACES)";A$(4);
     "(3 SPACES)P. ";A$(5);"(3 SPACES)";A$
     (6)
1060 PRINT #DE
1070 CALL KEY(0,O,S)
1080 IF S=0 THEN 1110
1090 CALL KEY(0,O,S)
1100 IF (S=0)+(D<>80)THEN 1090
1110 RETURN
```

Spelunker

Steve Hudson

Requirements: Commodore 64 with a disk drive; Atari 400/800, XL, or XE computer with at least 48K RAM and a disk drive. Joystick required.

Exploring a dangerous cavern in Spelunker.

Glowing rocks . . . buzzing bats . . . crevasses and drop-offs and ghosts. Do computers belong inside caves? Most experts say no.

But do caves belong inside computers? After you've played *Spelunker*, a recent release from Brøderbund, you'll answer that one with a resounding "Yes!"

In *Spelunker*, you're the last—literally—in a long line of intrepid adventurers. Your passion? Spelunking, the exploration of caves. Your task? To work your way through the myriad passages of a dangerous and uncharted cavern. Your goal? The Hidden Pyramid, which any good adventurer will tell you is the most priceless treasure of them all.

The Hidden Pyramid, you've been told, is stashed in the deepest and most remote corner of that cavern. Finding it is simple enough: Just struggle through hundreds of smoothly scrolling passages, and through six increasingly challenging levels, to the treasure chamber (which is goodness knows how far underground).

But getting there isn't going to be easy. You've got to contend with the basic cave-type creatures, of course—bats and ghosts and things like that. You'll also find some interesting geology, including pools of shimmering lava and steam vents that'll cook you like a lobster. Then there are crevasses and sheer drops and vents breathing volcanic fire. Nice, huh?

A Visual Delight

Fortunately, you have help. Earlier spelunkers (rest their souls) left caches of flares and dynamite throughout the cavern that are yours for the taking. You'll find extra batteries for your light, too, as well as occasional concentrations of magic cave dust. Magic cave dust? Mercifully, there isn't an alien for miles.

Graphically, *Spelunker* is exceptionally well done. In fact, the cavern is a visual delight. Its walls glow eerily, making the dim passageways seem that much spookier. Animation is smooth, and scrolling is faultless. The result is a video presentation that unquestionably enhances the atmosphere of the game.

Plaudits go to the game's sound effects, too. Some, like the hollow roar of exploding dynamite and the mechanical rasp of unoiled machinery, mimic real life with unusual acuity. Others, particularly the shrieks of bats or the whispered roar of your Phantom Blaster, could come only from some deep, dark cave.

Spelunker will undoubtedly challenge your reflexes. But like *LodeRunner*, an earlier (and now classic) Brøderbund release, *Spelunker* exercises mind as well as muscle. You'll have to think things over to make it through the caverns. Trust your intuition, and plan on planning ahead.

And get a comfortable chair. You'll be enjoying this one for a long, long time.

Spelunker
Brøderbund Software Inc.
17 Paul Drive
San Rafael, CA 94903
$29.95

Run For It

Karen McCullough

Requirements: Apple II-series computer with at least 48K RAM and a disk drive; or an Atari 400/800, XL, or XE computer with at least 48K RAM and a disk drive. Joystick optional but recommended.

Arcade games must strike a delicate balance between being easy enough for beginners to learn quickly and sufficiently challenging to keep old hands coming back for more. *Run For It*, from Weekly Reader Family Software, walks that thin line nicely. This is a game that children will fall in love with immediately and play interminably.

In *Run For It*, you guide a bouncy little robot named Orbit through a 72-room maze, trying to gather energy canisters to recharge him while dodging or shooting various enemies known as energy-draining anti-robot devices. You accumulate points by eliminating enemies and advancing through successive levels. To win you have to get Orbit through the final exit at the top of the maze.

Play begins in room 1 on level A, the lowest level. The maze consists of 18 levels of four rooms each. The levels are grouped together in threes so you can move freely through 12 rooms at a time. Although you don't have to go through all the rooms to get from one level to the next, all are worth investigating—some contain surprises (both pleasant and unpleasant). You leave each group of levels through special exits marked UP, and once you've left a group you cannot return.

As Orbit moves, he burns up energy which must be replaced by gathering energy canisters. The maze also conceals anti-robot devices of varying mobility, activity, and hostility. On the lower levels, they generally move in a set pattern, guarding a passage or an energy canister, but on the upper levels some will home in on Orbit and chase him. Others wait in ambush, ready to zap Orbit as soon as he pokes his nose through an exit. Collision with an enemy does not end play, but it costs a considerable quantity of energy. The game ends when Orbit exits through the top of the maze at room R4 or runs out of energy. (Guess which usually comes first!)

A Winsome Little Robot

Orbit can move in any direction on the

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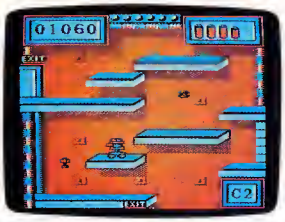

Orbit the robot makes his way through the maze in Run For It *(Apple version).*

screen. He can walk along platforms, squeeze below them, or jump from one to another. Controlling this movement takes some practice to master, particularly when using the keyboard. A joystick is highly recommended. However, if keyboard control is necessary, the program offers several options. Two different keys are available for moving in each direction, and they can be used in any combination. This should be particularly helpful for left-handers who have difficulty with the standard I-J-K-M diamond arrangement.

A four-page pamphlet explains the game's functions and features in adequate detail. The package also contains one copy-protected game disk, a 50 × 15 inch glossy color poster-map of all the rooms in the maze (an essential aid—you'll want to post it near the computer and refer to it often), and a page of Orbit stickers.

Run For It has pleasant animation, attractive three-dimensional graphics, exciting action, and interesting strategic challenges. Orbit is a winsome little robot, gratifyingly prompt in responding to directions. The game moves along quickly and smoothly, with surprisingly brief pauses for the screen display to change as Orbit moves from one room to another. In addition to the colorful room display, the screen shows the current score, energy level, and room label. A couple of other nice features include the ability to freeze the game at any point by pressing the ESC key, and the option to turn off the sound by pressing CTRL-Q.

There are only two minor weaknesses worthy of note. Although we didn't find the game sounds disturbing, the same is not true of the title screen, displayed when the disk is first booted and whenever a game ends. This screen is accompanied by music which deteriorates rapidly from obnoxious to intolerable. Another mildly irritating feature is the way the game treats high scores. It claims to save the five highest scores, but the last person playing always gets fifth place, so only four high scores are actually retained.

However, the strong points of *Run For It* well outweigh the weaknesses, and the number of hours we've spent playing the game testifies to its ability to provide continuing enjoyment.

Run For It
Weekly Reader Family Software
245 Long Hill Road
Middletown, CT 06457
$39.95

HomePak

Sheldon Leemon

Requirements: Atari 400/800, XL, or XE with at least 48K and a disk drive; or a Commodore 64 with a disk drive. Printer and modem recommended. Available soon for IBM PC, Enhanced Model PCjr, and Macintosh.

It is usually enough that a piece of software has multiple integrated functions, or takes a new and innovative approach, or that it is very inexpensive, full-featured, or particularly easy to use. *HomePak* is extraordinary in that it has all of these qualities. It is much to the credit of programmer Russ Wetmore that the package succeeds so well in striking a balance between its seemingly contradictory design objectives.

HomePak is a collection of three programs representing the types of software found most commonly around the home. It contains *HomeText*, a word processor; *HomeFind*, a filer; and *HomeTerm*, a terminal communications program. None of the programs is copy-protected, and the entire package sells for $49.95 (the forthcoming Macintosh version will be $69.95).

Don't be misled by the low price. These programs are by no means toy versions of similar stand-alone software. They are fully functional and even contain many extra convenience features usually found only in software that is much more expensive. An example is the degree to which each program can be customized by creating a disk file that saves the settings for screen and text colors, margins, key click off or on, and so forth.

At the same time, the programs are designed to be significantly easier for beginners to use than most other software. The programs even work alike, so using any one of them is similar to using the others.

The biggest drawback in trying to achieve so much at once is that it requires a lot of memory. This leaves less free RAM for the various applications than do comparable stand-alone programs.

HomeText

The *HomeText* program has most of the standard word processor features—full cursor control, block editing, printer controls, and file maintenance commands. The commands for printing, moving text, and maintaining disk files each have their own menus available at the touch of a function key.

For example, when you want to insert a printer command, you move the cursor to the appropriate place in text and press a function key which calls up the printer format window. This window appears in the middle of the screen, temporarily overlaying part of the text. It displays a menu that lets you choose such formatting functions as setting margins, line spacing, and indenting, plus printer features such as boldfacing, underlining, or expanded type. When you've selected an option, the menu disappears and your text is restored. A symbol on the screen shows where the command you selected has been inserted.

The block commands work much the same way. When you press a function key, a menu appears and asks whether you want to move, delete, or copy text. After making your choice, you're prompted to move the cursor and press RETURN at the beginning and end of the block. By providing these menus and plain-English prompts, *HomeText* makes it much easier for the person who is not familiar with word processing to use powerful features such as block moves and printer format commands. Yet, the program is structured so that, in most cases, advanced users can issue a command via a combination of keystrokes, bypassing the menus.

Another innovative feature of *HomeText* is the way it word-wraps. Like most word processors, *HomeText* automatically moves words which start near the end of the 40-column screen line down to the next line, rather than splitting the word between two screen lines. Word-wrapping makes the text easier to read, but also increases the chance of unwanted spaces between words—on the screen, you can't distinguish the spaces used to pad out a line from the "real" spaces. *HomeText* solves this problem by placing a little dot at the end of each screen line, letting you see exactly where the last space character is located.

HomeFind

The second program in the package, *HomeFind*, is a truly unique electronic filer. The most common type of information storage program for home computers is called a database manager. But the concept of a database manager is quite foreign to most people. To file information with a database manager, you first must set up a template of what each "record" looks like, complete with a name and description for each entry "field." Then you have to fill in the information in each field for each record.

HomeFind bypasses this rigmarole entirely. A two-window interactive system lets you type commands and questions in the bottom window while the computer types its answers in the top window. For each entry, you type in three items: a subject, a description of the information about that subject that you want to store, and the information itself. For example, if you want to make a note of Lenore's birthdate, you simply type, "Lenore's birthday is May 16, 1949." Later, when you want to look it up, you just type, "What's Lenore's birthday?" The computer replies, "Lenore's birthday is May 16, 1949." You can also type "What's birthday?" to get a list of all your birthday entries, or "Who's Lenore?" to get a printout of all entries about Lenore.

The program has a simple way of handling error-checking: When you feed it some unfamiliar bit of information, it reports "That's news to me." You can then either verify that you want to make a new entry or tell the computer to disregard your last entry—in the latter case, the computer responds, "Never mind."

Admittedly, *HomeFind* does lack the more sophisticated features found in most database managers, such as the ability to sort entries alphabetically, perform mathematical operations, and print carefully formatted reports. The only kind of hardcopy it generates is a simple list. But you have to balance the importance of such features against the extra study required to learn them. *HomeFind* presents a usable and sensible alternative for small record-keeping tasks, such as setting up an appointment calendar, a phone directory, and so on. It's the only database system I would classify as fun to use.

HomeTerm

The versatile *HomeTerm* telecommunications program rounds out the *HomePak* trio. Used with a modem, it allows you to link up with distant computers over ordinary telephone lines, store incoming text in a memory buffer, then save the buffer on disk or print it out (downloading). You can also load a disk file into the memory buffer and transmit it to the remote computer (uploading). For these transfers, *HomeTerm* supports the XMODEM protocol, a popular error-checking telecommunications scheme (see "Telecomputing Today," COMPUTE!, May and June 1985).

To help you manage your telecomputing costs, *HomeTerm* has a timer that keeps track of how much time you spend online.

One of the more unusual features of *HomeTerm* is its ability to open an edit window at the bottom of the screen. The text you type in the window is not sent to the modem until you press RETURN, and then it is sent all at once. This is extremely useful for computer conferences, because otherwise your outgoing text tends to get mixed up on the screen with incoming text from other participants.

Another advanced feature that *HomeTerm* offers is keyboard macros. You can define ten or more phrases of up to 70 characters each that can be sent with a single keystroke. There's even a little "macro language" that lets you insert pauses in the middle of a phrase. One use for these macros is to create logon sequences that automatically dial a phone number and type your user ID and password.

Commodore owners should note, however, that the first version of *HomeTerm* cannot dial the Commodore 1650 modem. Subsequent versions dial most Commodore modems and provide for Punter protocol transfers as well, so check the software before you buy it. Owners of the original Commodore version can return their program disk to the manufacturer for a free update to the new version.

HomePak Variations

Although the descriptions above generally apply to all versions of *HomePak*, there are some slight differences, largely due to memory limitations. The Atari versions of *HomeText* and *HomeTerm* have very small text buffers (only about 7K, or about three double-spaced printed pages); the Commodore 64 versions have somewhat larger buffers; and the PC and PCjr have good-sized buffers.

However, because *HomeText* lets you chain text files and *HomeTerm* lets you save incoming information on disk, the small buffers mainly limit the convenience of these programs, not their overall usefulness. Still, the more memory, disk storage, and function keys a computer has, the better *HomePak* works. (Incidentally, if you own more than one kind of computer, you should note that the Atari and Commodore versions are packaged together, as are the PC and PCjr versions.)

Though the price/performance ratio of home computers has been constantly improving at a dizzying pace, the same has not been true for home computer software. By making software of this caliber available at such a low price, Batteries Included is taking the first step toward closing that gap, thereby bringing the computer into more homes as a really useful tool.

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Batteries Included
186 Queen Street West
Toronto, Ontario
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Suite P
Irvine, CA 92714

$69.95 Macintosh version
$49.95 other versions

Gemstone Warrior

James V. Trunzo

Requirements: Commodore 64 with a disk drive; Apple II-series computer with at least 48K and a disk drive. Joystick optional but recommended.

Strategic Simulations Inc., better known simply as SSI, has built its formidable reputation in the software industry primarily on the excellence of its highly detailed, historically based computer war games. Even when SSI occasionally departs from this bread-and-butter genre—as it has with some fantasy, science-fiction, and sports games—the company has stuck with a realistic simulation/role-playing approach. With the release of *Gemstone Warrior*, SSI makes a triumphant entry into the arcade market.

Although *Gemstone Warrior* is billed as a strategic arcade/adventure (and certainly some strategy comes into play, as it does with all games), it is primarily an arcade game with an adventure motif—and a very challenging one at that.

The Gemstone, a source of unbelievable magical power, has been stolen by demons, plunging Earth into desperation and despair. Only a true hero can save mankind by regaining the Gemstone, now fragmented into five pieces scattered around the underworld domain of the demons. Reassembling the Gemstone is your task as a Gemstone Warrior. Using both the keyboard and joystick to maneuver your crossbow-armed warrior about the screen, you

must travel through 90 underground caverns, fighting a variety of monsters along the way. You also collect whatever treasures you can find on your vanquished foes or in chests and coffins.

Learning To Use Magic

While the concept is certainly simple enough, almost ordinary, the play itself is anything but simple. The skill needed to outmaneuver and outfight the monsters guarding the Gemstones will challenge even the best joystick jockies, and you must respond quickly with the keyboard that controls movement and the use of your magical treasures. Also essential to becoming competitive (forget about winning early on) is learning to recognize and understand the powers of each different magical device and opposing monster. How and when to use the magic at your disposal is where the strategy comes into play.

Gemstone Warrior has excellent graphics for a game of this type and some other niceties. You can select from several levels of difficulty, pause a game during play, and save a game in progress. The last feature is particularly useful because one game can take up to two hours to play—provided you've become proficient enough to survive the first five minutes!

SSI's first true entry into the arcade game field is an impressive one. We look forward to more.

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CAPUTE!

Modifications or Corrections To Previous Articles

IBM Disk Rx

Even though this disk file recovery program from the May issue (p. 90) provides a 48K storage area, it cannot be used as published on files longer than 32K. The reason for this is because the variables in the loops for reading characters from disk are integer variables, which are limited to a maximum value of 32,767. However, the changes below will allow you to use all the available workspace:

```
DN 520 SCTR=NONDATA: STP!=&H3C00
KN 990 STPF!=STP!
IN 1020    POKE STP!+I,PEEK(&HFD0
       0+I)
NP 1040 STP!=STP!+512
CH 1060 STPF!=STP!
JI 1290 IF STP!=&H3C00 THEN 1470
PH 1360 GOSUB 1730: GOSUB 1500
HP 1410 FOR I!=&H3C00 TO STP!
GE 1420    PRINT #1,CHR$(PEEK(I!)
       );
PM 1430 NEXT I!
```

Commodore File Protector

The author has supplied the following two corrections for this utility program from the April issue (p. 115), although the program works as published (assuming you added the appropriate line 20 from p. 115):

```
860 GOSUB 660:GOSUB 730
1050 GOSUB 660:GOSUB 730:PRINT
     "DISK IS UNLOCKED
```

Also, if you ever want to quickly unlock all the files on a disk, make the following *temporary* changes, which will cause menu option 2 to unlock all files instead of locking them. Don't save the "File Protector" program with these changes unless you are willing to give up the *lock all files* option, in which case you should change LOCK to UNLOCK in line 1100 to reflect the new function of that option:

```
150 IF (A AND 64)=0 THEN 170
160 PRINT#15,"B-P";2;P+32*I:PR
    INT#2,CHR$(A AND 135);
```

TurboDisk For Commodore 64

There are no errors in the 64 version of this high-speed disk loading utility (April issue, p. 86), yet we have received a number of letters from readers who experienced some difficulties implementing this program. It is important to follow the instructions accompanying the article rather precisely: *Do not* save Program 1 with the filename TURBODISK.OBJ. That is the name of the file containing the machine language for "TurboDisk" which is created on disk when you run Program 1. Use any name you want for Program 1 *except* TURBODISK.OBJ (or TURBODISK, which we suggested you use for Program 2). You do not need to save a copy of Program 1 on every disk on which you put Program 2. Rather, you should use Program 1 to write a copy of the TURBODISK.OBJ file to any disk from which you wish to use Program 2 to load and execute TurboDisk.

IBM Proofreader Enhancement

Reader Robert Trotte suggests adding a CLIST command combining the features of the existing CHECK and LLIST commands to the IBM version of the "Automatic Proofreader." This allows you to print out a listing with checksums for comparison with the published listing. Add the following line to the Proofreader:

```
415 IF COMMAND$="CLIST" THEN
    OPEN "lpt1:" FOR OUTPUT A
    S #1:CKFLAG=1: GOTO 300
```

Commodore Recruncher

Jerry Smith

This short machine language utility for the Commodore 64 or VIC-20 converts BASIC programs from ASCII to tokenized form. It can also merge two BASIC programs.

Have you ever tried to send or receive BASIC programs over a modem with a Commodore computer? It's not as easy as you might think. The difficulty stems from the way BASIC programs are stored. When you type in a BASIC line, keywords like PRINT, GOTO, and so on aren't spelled out in memory with individual characters, such as P-R-I-N-T. Instead, each keyword is converted into a one-byte value called a *token*. A tokenized program is said to be "crunched" because it takes considerably less space than it would in nontokenized form. This conserves memory and makes BASIC run faster.

BASIC tokens always have character code values greater than 127 (character codes are numbers assigned to characters according to the ASCII convention—American Standard Code for Information Interchange). Since much telecommunications software is designed to handle ASCII characters with values of only 127 or less, they may not transmit tokenized BASIC programs correctly. Many computers have commands to convert programs back and forth between ASCII and tokenized formats, but the Commodore 64 and VIC-20 do not. Therefore, to exchange Commodore BASIC programs with a modem, you have to convert the programs manually.

As you'll see in a moment, it's easy to "uncrunch" a tokenized BASIC program (convert the tokens into ASCII characters which the modem can transmit). However, the computer won't be able to run the program until you "recrunch" it—change the spelled-out keywords back into tokens again.

The solution is "Commodore Recruncher." It converts ASCII listings of BASIC programs into tokenized form and works with either tape or disk. Although it was written primarily to recrunch listings received over a modem, you can also use it to merge two programs into one.

Commodore 64 users should enter and save Program 1. Program 2 is the VIC-20 version. When you run Commodore Recruncher, it automatically relocates a small machine language program at the top of memory and places the starting address of the program in the computer's user vector. This allows you to activate the Recruncher with a simple USR function call no matter where the machine language is located.

Creating ASCII Files

Before using the Recruncher, you'll need something to recrunch. It's easy to convert a tokenized BASIC program into ASCII form. Load a program and enter the following line in direct mode (with no line number):

For disk:

```
OPEN 1,8,8,"filename,S,W":CMD
1:LIST
```

For tape:

```
OPEN 1,1,1,"filename":CMD 1:LIST
```

Substitute for *filename* the name under which you want the program stored. When you press RETURN, the program is written to disk or tape and the drive motor stops (although the red busy light on the disk drive remains on). You'll also see the READY prompt on the screen. *But the operation isn't finished.* At this point, it is *very important* to properly close the file. Do this by entering the following line in direct mode:

```
PRINT#1:CLOSE 1
```

If you fail to do this, the last few lines of your program are not written to tape or disk, and, for tape, the end-of-program marker is not added. Improperly closed disk files can be a real problem. If they are not removed from the disk, they can cause the disk directory to become garbled so that other programs are lost. (Unclosed files are so dangerous that they are sometimes referred to as "poison files.") Unclosed files show up on the disk directory with an asterisk (*) beside the file type. If you ever see an asterisk in a directory entry, get rid of the file at once. But don't use the normal SCRATCH (S0:) command to remove the file; instead use the VALIDATE command (OPEN 15,8,15,"V0:":CLOSE 15).

Disk users should note the suffix ,S,W following the filename in the above command. This stores the

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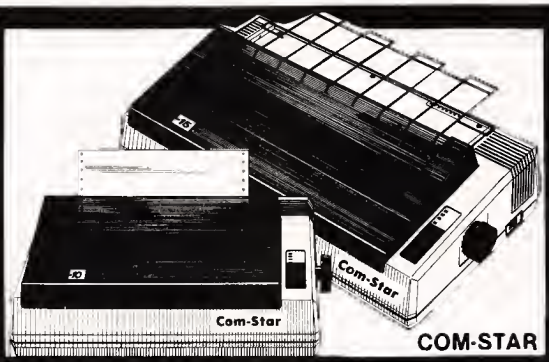

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Print Buffer Size: 132 Bytes (1 line)

No. of Chor. in Char. Set: 96 ASCII‡ International

Graphics Capability: Standard 60, 72 Dots Per Inch Horizontal, 72 Dots Per Inch Vertical

Pitch: 10, 12, 16.7, 5, 6, 8.3

Printing Method: Impact Dot Matrix

Chor. Motrix Size: (Standard) 9H x 8V, (Elongote) 10H x 8V

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Printing Speed: 80 CPS

PAPER

Type: Plain

Forms Type: Fanfold, Cut Sheet

Max Paper Width: 11"

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RIBBON

Type: Cassette — Fabric inked ribbon

Life: 1 million characters

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Character Font: 9 x 8 Standard, 10 x 8 Elongated, No. 8 pin to be used for underline

Character Set: 96 ASCII, 11 x 7 Internationol Char.

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ASCII listing on disk in sequential (SEQ) format. Most terminal software uses sequential files, but you can also substitute ,P,W to create a program (PRG) format ASCII listing. The Recruncher works equally well with either format. Tape users needn't worry about this distinction, since there's only one form of tape storage.

To make an ASCII file of part of a program on disk or tape, use the procedure above but specify line numbers after the LIST statement. For example, LIST 100–200 creates an ASCII file of lines 100 through 200. LIST –200 lists every line up through 200, and so on.

Recruncher

Unless you are merging two programs, you should always enter NEW before using the Recruncher. Otherwise the recrunched program is merged with the last program or disk directory loaded into memory. To activate the Recruncher, enter the following line in direct mode, replacing *filename* with the name of the file you want to recrunch:

For disk:

```
OPEN 1,8,8,"filename,S,R":A=USR(0)
```

For tape:

```
OPEN 1,1,0,"filename":A=USR(0)
```

When the READY prompt reappears, the program is stored in memory in tokenized form, ready for you to save, list, or run as usual. (Remember to enter CLOSE 1 to close the file.) Disk users should replace ,S,R with ,P,R to recrunch an ASCII listing saved in program (PRG) format.

Note that the Recruncher truncates overly long lines to the maximum length of the computer's input buffer (80 characters for the 64, 88 for the VIC). Any characters beyond those limits are dropped. You can type in such lines only by using keyword abbreviations (? for PRINT, and so on). Long lines from the original program must be typed in manually after recrunching, using the abbreviations shown in the *User's Manual*.

Merging Programs

To merge two programs together, first convert one of them into ASCII form as shown above. Then load the second program in the normal manner and activate the Recruncher *without* entering NEW. If the two programs do not have any matching line numbers, all the recrunched lines are added to the program in memory. If they have matching line numbers, the recrunched program lines replace the matching lines from the program already in memory. The merging capability provides an easy way to add standard subroutines to new programs.

Program 1: Commodore 64 Recruncher

Please refer to "COMPUTE!'s Guide to Typing In Programs" before entering this listing.

```
100 POKE56,PEEK(56)-1:CLR:REM
    {SPACE}RESERVE 1 PAGE AT T
    OP OF MEMORY          :rem 47
110 S=PEEK(55)+256*PEEK(56):RE
    M ML PROGRAM START ADDRESS
                          :rem 56
120 FORJ=STOS+239:READA:POKEJ,
    A:NEXT                :rem 67
130 POKE784,76:POKE785,PEEK(55
    ):POKE786,PEEK(56):NEW:REM
     SET USER VECTOR      :rem 115
140 DATA169,128,133,253,160,0,
    132,254,166,184,32,198,255
    ,165,253,208,11       :rem 226
150 DATA165,184,32,195,255,32,
    204,255,76,116,164,32,207,
    255,166,144,240       :rem 230
160 DATA10,160,0,132,253,224,6
    4,240,2,208,228,164,254,19
    2,89,208,4            :rem 218
170 DATA201,13,208,229,201,13,
    208,2,169,0,8,153,0,2,200,
    230,254               :rem 40
180 DATA40,208,213,162,255,160
    ,1,134,122,132,123,32,115,
    0,240,2,144           :rem 234
190 DATA6,160,0,132,254,240,16
    8,32,107,169,32,121,165,13
    2,11,32,19            :rem 208
200 DATA166,144,68,160,1,177,9
    5,133,35,165,45,133,34,165
    ,96,133,37            :rem 243
210 DATA165,95,136,241,95,24,1
    01,45,133,45,133,36,165,46
    ,105,255,133          :rem 70
220 DATA46,229,96,170,56,165,9
    5,229,45,168,176,3,232,198
    ,37,24,101            :rem 2
230 DATA34,144,3,198,35,24,177
    ,34,145,36,200,208,249,230
    ,35,230,37            :rem 226
240 DATA202,208,242,32,51,165,
    173,0,2,240,161,240,163,24
    ,165,45,133           :rem 250
250 DATA90,101,11,133,88,164,4
    6,132,91,144,1,200,132,89,
    32,184,163            :rem 217
260 DATA165,20,141,254,1,165,2
    1,141,255,1,165,49,164,50,
    133,45,132            :rem 211
270 DATA46,164,11,136,185,252,
    1,145,95,136,16,248,32,51,
    165,169,0             :rem 186
280 DATA240,197           :rem 23
```

Program 2: VIC-20 Recruncher

Please refer to "COMPUTE!'s Guide to Typing In Programs" before entering this listing.

```
100 POKE56,PEEK(56)-1:CLR:REMR
    ESERVE1PGEATTOPOFMEMORY
                          :rem 238
110 S=PEEK(55)+256*PEEK(56):RE
    MMLPROGRAMSTARTADDRESS
                          :rem 56
120 FORJ=STOS+239:READA:POKEJ,
    A:NEXT                :rem 67
130 POKE0,76:POKE1,PEEK(55):PO
    KE2,PEEK(56):NEW      :rem 254
140 DATA169,128,133,253,160,0,
    132,254,166,184,32,198,285
    ,165,253,208,11       :rem 226
150 DATA165,184,32,195,255,32,
    204,255,76,116,196,32,207,
    255,166,144,240       :rem 235
160 DATA10,160,0,132,253,224,6
    4,240,2,208,228,164,254,19
    2,89,208,4            :rem 218
170 DATA201,13,208,229,201,13,
    208,2,169,0,8,153,0,2,200,
    230,254               :rem 40
180 DATA40,208,213,162,255,160
    ,1,134,122,132,123,32,115,
    0,240,2,144           :rem 234
190 DATA6,160,0,132,254,240,16
    8,32,107,201,32,121,197,13
    2,11,32,19            :rem 200
200 DATA198,144,68,160,1,177,9
    5,133,35,165,45,133,34,165
    ,96,133,37            :rem 248
210 DATA165,95,136,241,95,24,1
    01,45,133,45,133,36,165,46
    ,105,255,133          :rem 70
220 DATA46,229,96,170,56,165,9
    5,229,45,168,176,3,232,198
    ,37,24,101            :rem 2
230 DATA34,144,3,198,35,24,177
    ,34,145,36,200,208,249,230
    ,35,230,37            :rem 226
240 DATA202,208,242,32,51,197,
    173,0,2,240,161,240,163,24
    ,165,45,133           :rem 285
250 DATA90,101,11,133,88,164,4
    6,132,91,144,1,200,132,89,
    32,184,195            :rem 222
260 DATA165,20,141,254,1,165,2
    1,141,255,1,165,49,164,50,
    133,45,132            :rem 211
270 DATA46,164,11,136,185,252,
    1,145,95,136,16,248,32,51,
    197,169,0             :rem 191
280 DATA240,197           :rem 23
```

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Extended Color Mode For Commodore

Jim Butterfield, Associate Editor

Here's how to control the background color of individual characters to add variety to graphics displays on the Commodore 64, Plus/4, and 16.

There's a feature on the Commodore 64 that's not very well known. It can help you create attractive displays very easily, especially for poster-type screen announcements. It's called *extended background color mode*, and it lets you control the background color of each character on the screen. Extended color mode is available on the Plus/4 and Commodore 16 as well.

Normally, you may choose a range of colors for any character that your Commodore 64 displays on the screen. But each foreground character is set against a single background color. You know the background color: That's the one you set with POKE 53281 on the 64. Let's categorize the choices: Each foreground character may be one of 16 colors; there are up to 128 possible characters, plus reverse characters; and the screen has only one background color.

Let's propose a trade. If you cut down your character set to 64 characters, with no reverse characters allowed, you can independently select any of four background colors for each character. Meanwhile, you still retain a full choice of 16 character colors.

How do we make such a trade? By selecting extended color mode, giving away our extra characters in favor of a choice of backgrounds. On the Commodore 64, you can switch modes with POKE 53265,91. On the Commodore 16 or Plus/4, it's done with POKE 65286,91. Don't do it yet, however; this POKE should be used only within a program.

If you couldn't wait and typed in the POKE anyway, you'll have some trouble seeing the cursor. The cursor flash effect is achieved by using reverse characters; as soon as you switched to extended color mode, you gave away those reverse characters. Thus, you're probably typing semi-blind. Put everything back with a POKE to the same address using a value of 27 rather than 91. You'll be happy to see the cursor again.

The Tradeoff

When you activate extended color mode, you add extra background colors, but you lose some characters. You get only 64 characters—generally the unSHIFTed character set—with no reverse characters.

What happens to the missing characters? They're used to select background colors. When we get down to programming, we'll seem to be trying to print reversed characters, or SHIFTed characters, or both together. However, when the program runs, the standard unSHIFTed characters are displayed on a variety of colored backgrounds. If this seems complex, be patient; the example makes everything clear.

Thus, extended color mode limits us to the unSHIFTed characters. Depending on which mode we're in, that might be either uppercase (graphics mode) or lowercase (text mode). Fancy graphics characters are unavailable—but you'll find that the screen gains extra richness from the variety of backgrounds.

Choosing The Background

First you must pick the four background colors you want. The first one is the standard background color; on the 64, you set it with a POKE into 53281, the familiar control address. The other three are easy; on the 64, you set them with POKEs to 53282, 53283, and 53284. On the Plus/4 and Commodore 16, you may use the COLOR command to set two of these colors (COLOR 0 and COLOR 3 will work), but you'll be better off to POKE addresses 65301, 65302, 65303, and 65304. Here's what these control addresses do in extended color mode:

	64	Plus/4 and 16
Normal Background Color	**53281**	**65301**
SHIFTed Character Color	**53282**	**65302**
Reversed Character Color	**53283**	**65303**
SHIFTed/Reversed Character Color	**53284**	**65304**

The table above also hints at the way you choose the background color. If you print an unSHIFTed character, it appears on the standard screen background. If you print a SHIFTed character, it appears as an unSHIFTed character (but on a different background), and so on.

A Simple Banner Program

Enter and save one of the programs below, then run it for a demonstration of extended background color mode. Commodore 64 users should

type in Program 1 exactly as listed. If you are using a Plus/4 or 16, enter Program 1 but substitute lines 210–250, 420, and 450 from Program 2. Be sure to press SHIFT when typing the underlined characters as explained in "COMPUTE!'s Guide to Typing In Programs" elsewhere in this issue, and note that {SHIFT-SPACE} simply means to hold down SHIFT while typing a space.

Lines 100 to 150 of the program contain the character data to be printed, plus a numeric flag to indicate reverse video printing. We could achieve the same thing within the string using clever cursor movements, but it would be a little harder to type. The X character in line 150 is a signal for us to stop.

At line 200, we print three special characters: 142 moves us to graphics mode so that we'll print the message in capitals, 147 clears the screen, and 144 sets the printing color to black. We could choose to print in any color combinations, of course.

Lines 210 to 240 set the four background colors. We'll meddle with color number 4 later, but this sets it initially. The Plus/4 and 16 can control both the color and the *hue* (brightness); try experimenting with these values as well.

Line 250 switches into multicolor mode. We're ready to print, and that's what we do in lines 300 to 370. Each line is centered on the screen: The program calculates the number of empty spaces on the line (variable T) and then TABs half that distance to center the message. If the flag X shows that we want reverse video, the program activates it by printing CHR$(18) in line 350.

Lines 400 to the end cycle the background 4 color register through a range of values so the background behind the message COMMODORE EXTENDED COLOR changes continually. When the program is finished, the POKE in line 450 turns off extended color mode and returns the display to normal. It's interesting to see the characters assume their true identities as the program terminates.

Problems And Challenges

In the above example, we've used only one printing color—black. In fact, you can choose as many as you want to generate very effective "posters." We've all noticed that some colors work together better than others, so you may try various combinations for the best effect.

For alphabetic characters and spaces, it's easy to find the equivalent SHIFTed character: Just hold down the SHIFT key and you've got it. It's a challenge, however, to find some of the SHIFTed equivalents of punctuation and numeric keys. I won't give the game away by telling you the special combinations, but here's a hint. Activate extended color mode and then try pressing keys while holding down the Commodore logo key. Make a note of what you find so you can generate the characters later.

Extended color mode deserves more attention. With a little artistry you can divide the screen into different colored windows for more dynamic and colorful graphic effects.

Please refer to "COMPUTE!'s Guide to Typing In Programs" before entering these listings.

Program 1: Extended Color Mode For Commodore 64

```
100 DATA "HELLO",0
110 DATA "WELCOME{SHIFT-SPACE}
    TO{SHIFT-SPACE}THE",0
120 DATA "WONDERFUL WORLD OF",
    1
130 DATA "COMMODORE
    {SHIFT-SPACE}EXTENDED
    {SHIFT-SPACE}COLOR",1
140 DATA "PRESS ANY KEY TO QUI
    T",0
150 DATA "X",0
200 PRINTCHR$(142)CHR$(147)CHR
    $(144)
210 POKE53281,1
220 POKE53282,2
230 POKE53283,3
240 POKE53284,4
250 POKE53265,91
300 PRINT
310 READX$,X
320 IFX$="X"GOTO400
330 T=40-LEN(X$)
340 PRINTTAB(T/2);
350 IFX=1THENPRINTCHR$(18);
360 PRINTX$
370 GOTO300
400 C=3
410 C=C+1:IFC>15THENC=2
420 POKE53284,C
430 FORJ=1TO1000:NEXTJ
440 GETX$:IFX$=""GOTO410
450 POKE53265,27
```

Program 2: Plus/4 and Commodore 16 Modifications

```
210 POKE65301,113
220 POKE65302,82
230 POKE65303,83
240 POKE65304,84
250 POKE65286,91
420 POKE65304,C
450 POKE65286,27
```

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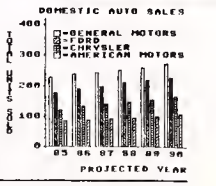

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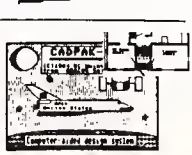

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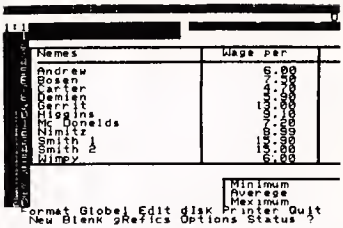

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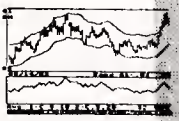

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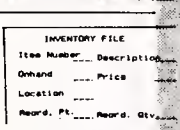

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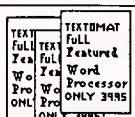

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Atari LIST Scroller

Royce Decker

Scroll BASIC listings up or down the screen with this short program for Atari 400/800, XL, and XE computers.

The LIST command in Atari BASIC is fairly versatile, allowing you to list all or part of a program while you press CTRL-1 to pause. But once the listing begins, you can only scroll forward to higher line numbers. Many times it would be convenient to scroll backward as well to examine previous lines.

"Atari LIST Scroller" lets you scroll a listing in either direction with single-key control. This feature is especially useful for proofreading a long program. Type Atari LIST Scroller as listed below, and save it on disk or tape with the LIST command instead of SAVE or CSAVE (type LIST"C" for tape or LIST"D:*filename*" for disk). It is essential that you save the utility in this format so you can merge it with your BASIC program later.

Now, LOAD or ENTER the BASIC program you wish to examine. Then call up LIST Scroller by typing ENTER"C" for tape or ENTER "D:*filename*" for disk. This loads the utility into memory without disturbing the first program. After you type RUN, LIST Scroller prompts you to enter a line number. The listing begins at that line and continues forward until the screen is full or the program ends. The listing is double-spaced to improve readability.

To scroll the listing up or down, press the ↑ or ↓ key (you need not hold down the CTRL key while pressing these keys). If you try to scroll back before the first line in the program, LIST Scroller pauses. If you try to scroll beyond the highest line number, LIST Scroller informs you that you've reached the end. You can also reach distant portions of the program quickly: Press the space bar and answer the prompt by entering a new line number. The listing continues from that point.

LIST Scroller ignores line 0 and lines above 32699 (otherwise it would list itself). If your BASIC program uses these line numbers, LIST Scroller automatically replaces them when you ENTER it from disk or tape.

To edit your BASIC program, exit LIST Scroller by pressing the BREAK key. Reenter it by typing RUN. Keep in mind that LIST Scroller appends itself to your program: If you want to save your program after using LIST Scroller, delete line 0 and lines 32701–32741 before saving, or save your program with this command:

LIST"C",1,32699
(for tape)

LIST"D:*filename*",1,32699
(for disk)

Of course, this means you'll have to load it with the ENTER command instead of LOAD or CLOAD.

To run your program without activating LIST Scroller, type GOTO the first line number in your program. Be aware, however, that unless your program is a closed loop, the computer will try to execute the LIST Scroller routine after your program is finished.

Atari LIST Scroller

Please refer to "COMPUTE!'s Guide to Typing In Programs" before entering this listing.

```
PF 0 OIM T(4):POKE 752,1:OL=
     PEEK(560)+PEEK(561)*256
     :OM=PEEK(OL+4)+PEEK(OL+
     5)*256+2:GOTO 32701
HD 32701 AORS=PEEK(136)+PEEK
     (137)*256:A=AORS:Z=
     0:N=-2
NJ 32702 LNUM=PEEK(A)+PEEK(A
     +1)*256:IF LNUM=327
     00 THEN GOTO 32704
NN 32703 N=N+1:A=A+PEEK(A+2)
     :GOTO 32702
OA 32704 TRAP 3273B:OIM L(N)
     :A=AORS:FOR B=0 TO
     N
FG 32705 L(B)=PEEK(A)+PEEK(A
     +1)*256:A=A+PEEK(A+
     2):IF L(B)=0 THEN 3
     2705
ID 32706 NEXT B
PN 32707 TRAP 40000:TRAP 327
     07:? "LINE NUMBER":
     INPUT X:IF X>L(B-1)
      THEN ? "LARGEST LI
     NE IS ";:? L(B-1):G
     OTO 32707
BD 32708 IF X>L(Z) THEN Z=Z+
     1:GOTO 32708
FA 32709 IF Z<0 THEN Z=0
PN 32710 ? "{CLEAR}"
LC 32711 TRAP 32737:LIST L(Z
     ):POKE 764,255:IF P
     EEK(84)<22 THEN Z=Z
     +1:GOTO 32711
HL 32712 IF PEEK(764)=14 THE
     N 32727
HL 32713 IF PEEK(764)=15 THE
     N 32716
CG 32714 IF PEEK(764)=33 THE
     N Z=0:POSITION 0,23
     :GOTO 32707
DK 32715 GOTO 32712
LM 32716 LNUM=0:F=OM:GOSUB 3
     2739
JL 32717 POSITION 2,0:? "
     {3 INS LINE}";:FOR
     LINE=0 TO 8-1:IF LN
     UM=L(LINE) THEN Z=L
     INE-1:GOTO 32719
GM 32718 NEXT LINE
JF 32719 IF Z<0 THEN Z=0:POK
     E 764,255:GOTO 3271
     2
HG 32720 LIST L(Z):POKE 764,
     255:GOTO 32722
GG 32721 NEXT LINE
KO 32722 IF PEEK(764)=255 TH
     EN 32722
LF 32723 IF PEEK(764)<>15 TH
     EN 32712
BK 32724 Z=Z-1:IF Z<0 THEN Z
     =0:POKE 764,255:GOT
     O 32712
DI 32725 POSITION 2,0:? "
     {2 INS LINE}";
HN 32726 LIST L(Z):POKE 764,
     255:GOTO 32722
DJ 32727 F=OM+920:LNUM=0:TRA
     P 32737
NA 32728 IF PEEK(F)=0 THEN F
     =F-40:GOTO 32728
GB 32729 F=F-40
HF 32730 FOR INCR=0 TO 37:IF
      PEEK(F+INCR)=0 THE
     N NEXT INCR:F=F+40:
     GOTO 32732
EA 32731 GOTO 32729
LA 32732 GOSUB 32740:FOR LIN
     0=0 TO 8:IF LNUM=L(
     LINO) THEN Z=LINO+1
     :POSITION 0,23:LIST
      L(Z):POKE 764,255:
     GOTO 32734
HD 32733 NEXT LINO
LE 32734 IF PEEK(764)=255 TH
     EN 32734
LH 32735 IF PEEK(764)<>14 TH
     EN 32712
AH 32736 Z=Z+1:LIST L(Z):POK
     E 764,255:GOTO 3273
     4
IG 32737 TRAP 40000:POSITION
      2,23:? L(B-1);:? "
     {3 SPACES}IS THE LA
     ST PROGRAM LINE":PO
     KE 764,255:GOTO 327
     12
MA 32738 ? "NO PROGRAM IN ME
     MORY":END
PI 32739 IF PEEK(F)<16 THEN
     F=F+40:GOTO 32739
ML 32740 FOR O=0 TO 4:IF PEE
     K(F)<>0 THEN T(O)=P
     EEK(F):F=F+1:NEXT O
OI 32741 FOR E=0 TO O-1:LNUM
     =LNUM+INT((T(E)-16)
     *10^(O-E-1)+0.5):NE
     XT E:RETURN
```

Viewports In IBM BASIC

John Kearney

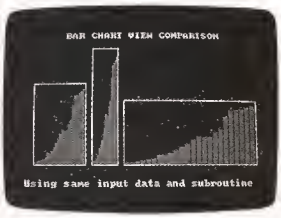
Much of today's commercial software offers innovative graphics effects like multiple windows and split screens. But with a little-known statement in IBM BASICA and PCjr Cartridge BASIC, you can build similar features into your own programs.

Lots of power is hidden within the depths of IBM BASIC. So many statements, commands, and functions are tucked away that it's difficult to assimilate them all without studying the manual from cover to cover—a tedious task. It's easy, therefore, to miss some really useful features that can significantly enhance your programs.

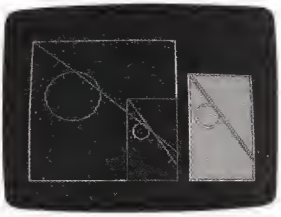
One of these is the VIEW statement. IBM devotes no less than five pages and two good examples to explain this statement in the PCjr Cartridge BASIC manual, but even with that, many mysteries remain.

The VIEW statement lets you segment or define an almost unlimited number of rectangular sections on the screen. Each *viewport,* as it is called, becomes a separate window with its own graphics and text, like a smaller screen pasted over the main screen. Viewports can exist independently of each other and can be of any size within the dimensions of the screen. Some can even be invisible! What makes viewports truly amazing is the way they handle graphics.

To see for yourself the versatility of viewports, try running the example programs following this article. For example, Program 1 (for the PCjr only) shows off the variety of viewport sizes, colors, and borders. By examining these programs



Program 1 shows viewports of various sizes with graphics in each.



Program 2 demonstrates the automatic scaling capabilities of viewports.

Program 3 shows how concentric circles are automatically scaled only within the small invisible viewport at the center of the screen.

and comparing them with the results when they're run, you'll see how easy it is to use the VIEW statement.

A Bird's-Eye VIEW

With VIEW, you can locate a viewport anywhere on the screen, adjust the size of the viewport, fill the viewport with color, and assign a color to the surrounding border lines.

Here's the basic format of the VIEW statement:

```
VIEW [[SCREEN] [(x1,y1)-(x2,y2)
  [,[attribute] [,[boundary]]]] ]
```

Let's explain these parameters one by one—they're not as difficult as they may appear.

The first step before using VIEW at all is to declare the screen mode. VIEW works only in the graphics modes: SCREEN 1 or SCREEN 2 in BASICA on the IBM PC, and SCREEN 1 through SCREEN 6 in Cartridge BASIC on the PCjr. SCREEN 0 is a text mode and can't be used with VIEW.

At first glance, you may think the SCREEN parameter in the VIEW statement lets you specify the screen mode, but it doesn't. Actually, this parameter determines how other graphics statements affect the viewports and main screen background, so let's skip this for a moment.

After declaring the screen mode with a separate SCREEN statement, you define the size of the viewport by specifying two sets of screen coordinates. The coordinates, naturally, correspond to the resolution available in the graphics mode you selected. For example, SCREEN 1 has 320 horizontal pixels by 200 vertical pixels, so the viewport must fit within this range (see Table 1). Remember that screen coordinates are numbered beginning with 0, so the actual range of coordinates in SCREEN 1 would be 0 to 319 horizontally and 0 to 199 vertically.

Table 1: IBM Graphics Modes

Mode	Resolution	Colors
SCREEN 1	320 × 200	4
SCREEN 2	640 × 200	2
SCREEN 3*	160 × 200	16
SCREEN 4*	320 × 200	4
SCREEN 5*	320 × 200	16
SCREEN 6*	640 × 200	4

**Available only in PCjr Cartridge BASIC. SCREEN 5 and 6 require at least 128K RAM.*

The first set of coordinates (*x*1,*y*1) defines the position of the viewport's upper-left corner; *x*1 is the horizontal coordinate and *y*1 is the vertical coordinate. The second set of coordinates (*x*2,*y*2) defines the lower-right corner. So, if you want a very large viewport in SCREEN 1, you might specify:

```
VIEW (4,1)-(300,100)
```

Or, for a very small viewport, you could specify:

```
VIEW (4,1)-(10,12)
```

Making It Visible

If you actually enter the above statements, you won't see anything happen. The viewport is there, but it's invisible. To make it appear, you have to set the viewport apart from the main screen background by filling it with color or surrounding it with a colored border. That's the purpose of the last two parameters of the VIEW statement.

Table 2: Attribute Color Numbers

0 black	8 gray
1 blue	9 light blue
2 green	10 light green
3 cyan	11 light cyan
4 red	12 light red
5 magenta	13 light magenta
6 brown	14 yellow
7 white	15 bright white

The *attribute* parameter lets you fill the viewport with the color assigned to that attribute number. The *boundary* parameter lets you draw a border around the viewport with the color assigned to the attribute number. Attribute numbers can range from 0 to 15, but of course this depends on the number of colors available in the screen mode you choose (see your BASIC manual). For instance, Table 1 shows that SCREEN 1 is a four-color mode, so it has four attributes, numbered 0 to 3. Table 2 shows which colors are assigned to which attributes. Keep in mind that you can assign any color to any attribute number with the PALETTE and PALETTE USING statements.

Here are some examples:

```
VIEW (4,1)-(300,100)
```
(Attribute parameter is omitted, so viewport defaults to same color as screen, rendering viewport invisible.)

```
VIEW (4,1)-(300,100),4,14
```
(Red viewport with yellow border.)

```
VIEW (4,1)-(300,100),5,7
```
(Magenta viewport with white border.)

Once a viewport is defined and activated, the coordinates inside the viewport are no longer the same as the main screen coordinates. We'll explain this in a moment.

Automatic Scaling

After you've created a viewport, you can print text or draw graphics inside it. Since the viewport is smaller than the main screen, however, a full-size graphics figure may not fit within its boundaries. You have to scale down the size of the figure to avoid what's called a *clipping* effect (the parts of the figure which don't fit are cut off, or clipped, within the viewport). Ordinarily, this scaling requires manual calculations. But another IBM BASIC statement—WINDOW—can help scale the graphics automatically.

With WINDOW, each viewport acts as a microcosm of the main screen, so the computer automatically fits the graphics into the viewport. This scaling effect is demonstrated by Programs 1 and 2 (see photos). For instance, Program 2 uses identical graphics subroutines for each viewport, even though the viewports are different sizes.

A full explanation of all the possibilities of WINDOW and VIEW is beyond the scope of this article. However, for scaling purposes with viewports, you can simply insert this WINDOW statement prior to the VIEW statement:

```
WINDOW SCREEN (x1,y1)-(x2,y2)
```

where *x*1,*y*1 are the upper-left corner coordinates of the graphics mode (0,0), and *x*2,*y*2 are the lower-right corner coordinates (for instance, 319,199 in SCREEN 1).

When you set up a viewport, the coordinates within its boundaries no longer correspond to the coordinates of the main screen. Instead, the coordinates for the upper-left corner of any viewport are (0,0), no matter where the viewport is located.

There may be times when you don't want the automatic-scaling feature. You can defeat it simply by leaving out the WINDOW statement. You can also experiment with another variation of the VIEW statement by including the SCREEN parameter mentioned earlier. When

SCREEN is included, all viewport coordinates coincide with the main screen coordinates. That is, the upper-left corner coordinates correspond to the main screen coordinates at that point, rather than 0,0. Points plotted outside the viewport boundaries won't appear on the screen.

Active And Inactive Viewports

Like other screen statements, the CLS (clear-screen) statement works in an interesting way with VIEW. When your program is executing, the viewport most recently defined is your current and only *active* viewport. All other viewports are inactive, as is the main screen. As a result, CLS clears only the area inside the active viewport. This may lead to some fascinating graphics effects.

If your program no longer requires viewports, changing screen modes with the SCREEN statement removes them. Likewise, a VIEW statement without any parameters followed by CLS defines the entire screen as a viewport and clears it, accomplishing basically the same thing.

Most of the BASIC graphics statements work with viewports, but there are a few exceptions. Some statements don't automatically scale themselves to fit within the viewport's boundaries. Those that work include GET, PAINT, PRESET, PMAP, PUT, PSET, POINT, LINE, VIEW, and WINDOW.

Statements that deserve more attention are CIRCLE (the size of the circle does not automatically scale or change shape if different viewports are the same width); and DRAW, LOCATE, and PRINT, which aren't restricted to the area of an active viewport.

Some of these effects are demonstrated by Program 3. It starts by executing a subroutine that draws a series of concentric circles without any viewports. Next it defines five viewports with borders and clears them with CLS. At this point, only the final viewport is active and capable of accepting graphics commands. Then the program repeats the same subroutine that draws the circles, showing that only parts of the circles appear in the active viewport.

Immediately afterward, the program executes a WINDOW statement and defines a very small invisible viewport at the center of the screen. Then it repeats the circles subroutine again, showing how the circles are scaled down to the size of the single invisible viewport.

Please refer to "COMPUTE!'s Guide to Typing In Programs" before entering these listings.

Program 1: PCjr Viewport Demo

```
MA 10 'Initialize
JD 20 '
DB 30 SCREEN 3:CLS:KEY OFF
DF 40 WINDOW SCREEN (0,0)-(159,1
      99)
JB 50 '
BC 60 'Define views
JD 70 '
DJ 80 VIEW (10,1)-(100,160),,5
GM 90 VIEW (70,70)-(100,160),,9
JD 100 VIEW (110,40)-(150,160),4
      ,10
GG 110 '
EM 120 'Activate viewports
MK 130 '
FP 140 VIEW (10,1)-(100,160):GOS
      UB 210
CP 150 VIEW (70,70)-(100,160):GO
      SUB 210
JC 160 VIEW (110,40)-(150,160):G
      OSUB 210
FH 170 GOTO 170
ME 180 '
DM 190 'Graphics subroutine
BF 200 '
FD 210 CIRCLE(45,80),50,2
IC 220 FOR X=1 TO 199
AD 230 PSET(X,X),3
GG 240 NEXT X
MG 250 RETURN
```

Program 2: Automatic Viewport Scaling

```
IC 10 ' Initialize
JO 20 '
MI 30 CLS:KEY OFF
KP 40 SCREEN 1
EN 50 COLOR 0,1
AB 60 WINDOW SCREEN (0,0)-(319,1
      99)
AB 70 L$="BAR CHART VIEW COMPARI
      SON"
JO 80 GOSUB 340
HB 90 LOCATE 22,2:PRINT "Using s
      ame input data and subrout
      ine"
BE 100 '
DL 110 VIEW(20,60)-(80,150),,3
GL 120 GOSUB 230
CP 130 VIEW(90,20)-(120,150),,3
LP 140 RESTORE 380
GB 150 GOSUB 230
QL 160 VIEW(130,80)-(299,150),,3
LF 170 RESTORE 380
GH 180 GOSUB 230
HB 190 GOTO 190
BF 200 '
DO 210 ' Graphics subroutine
MJ 220 '
PD 230 READ N
NP 240 OX=1/N:OOX=.75*OX*319:Y=1
      99
HK 250 FOR I=0 TO N-1
CN 260 X=OX*I*319:'multiply frac
      tional range by 319 to fi
      t coordinates 0-1 into ac
      tual grid of 0-319
HK 270 READ D:O=O/1.25:'scale d
      to fit 0-250 into actual
      grid of 0-199 (250/200=1.
      2)
DJ 280 LINE (X,Y)-(X+OOX,Y-O),2,
      BF
OK 290 NEXT I
MN 300 RETURN
HJ 310 '
HK 320 ' Center titles
HM 330 '
CF 340 LOCATE 1,(40-LEN(L$))/2
MA 350 PRINT L$
MJ 360 RETURN
HE 370 '
DB 380 DATA 24
IL 390 DATA 3.9,5.3,7.2,9.6
LE 400 DATA 12.9,17.0,33.2,31.4
EI 410 DATA 39.8,50.2,62.9,76.0
GD 420 DATA 92.0,105.7,102.8,101
      .7
QK 430 DATA 122.7,134.3,183.2,21
      1.0
OF 440 DATA 212.7,217.3,223.2,23
      1.0
```

Program 3: Viewport Variations

```
IC 10 ' Initialize
JD 20 '
FL 30 CLS:SCREEN 1:KEY OFF
IP 40 GOSUB 330
JB 50 '
NI 60 ' Viewport coordinates
JD 70 '
OA 80 A1=8:A2=8:A3=52:A4=52
BF 90 B1=64:B2=8:B3=112:B4=112
HI 100 C1=8:C2=66:C3=52:C4=180
BF 110 O1=124:D2=8:D3=150:D4=180
BN 120 E1=64:E2=124:E3=112:E4=18
      0
CL 130 F1=140:F2=80:F3=180:F4=12
      0
HM 140 '
DF 150 ' Define viewports
HA 160 '
QN 170 VIEW (A1,A2)-(A3,A4),,2:C
      LS
CG 180 VIEW (B1,B2)-(B3,B4),,1:C
      LS
IF 190 VIEW (C1,C2)-(C3,C4),,2:C
      LS
KL 200 VIEW (D1,D2)-(D3,O4),,1:C
      LS
QK 210 VIEW (E1,E2)-(E3,E4),,2:C
      LS
MJ 220 '
PA 230 VIEW SCREEN(B1,B2)-(B3,B4
      )
HL 240 GOSUB 330
MP 250 '
FB 260 WINDOW SCREEN(0,0)-(319,1
      99)
GK 270 VIEW (F1,F2)-(F3,F4)
MD 280 GOSUB 330
IM 290 GOTO 290
GG 300 '
LN 310 ' Circle subroutine
HK 320 '
EM 330 FOR X=1 TO 100 STEP 4
DD 340 CIRCLE(160,100),X+60,3
MJ 350 NEXT X
MJ 360 RETURN
```

Apple *SpeedScript 3.0* ProDOS Converter

Kevin Martin, Editorial Programmer

Last month, COMPUTE! *published the Apple version of the popular* SpeedScript 3.0 *word processor for* DOS 3.3. *This month we present "ProDOS Converter," a program that modifies the* DOS 3.3 *version of* SpeedScript *to create an enhanced ProDOS version. It works on any Apple II-series computer with at least 64K RAM, a disk drive, and the ProDOS operating system.*

Apple's ProDOS operating system offers a considerable improvement in performance and utility over DOS 3.3, but also makes things a little more complicated. ProDOS uses and lays out memory in a different way than DOS 3.3, so many DOS 3.3 machine language programs are not compatible with ProDOS. Also, many DOS 3.3 functions are not supported in the same way by ProDOS. This is enough to keep the Apple version of *SpeedScript* 3.0 (COMPUTE!, June 1985) from running with ProDOS, even if you save it on a ProDOS disk.

The solution is "ProDOS Converter," which changes an existing copy of DOS 3.3 *SpeedScript* into a program usable with ProDOS. As a bonus, ProDOS *SpeedScript* gives you 10K more text memory to work with.

Making The Conversion

First, you'll need to type in *SpeedScript* from last month's issue, if you haven't already. We also offer a disk containing all the Apple programs published in June (see box), which can save you considerable typing effort. To prepare for the conversion, type in both Program 1 and Program 2 below. Program 1 is a BASIC program that makes the changes to *SpeedScript*. Program 2 is a binary file that must be typed in with "Apple MLX" (The Apple MLX program was published in the same issue as *SpeedScript* and also is included on the June disk). When using Apple MLX to enter the *SpeedScript* data, you have to enter a line of POKEs in direct mode before loading MLX. This is *not* necessary before loading MLX to enter the data from Program 2. Simply load and run the MLX program.

Apple MLX asks you for the starting and ending addresses of the program you're typing in. Enter 3AF0 for the starting address, and 3CBF for the ending address. Next you'll see a menu. Press E to enter data, then enter 3AF0 as the address at which to begin typing. Program 2 is not a long listing, so take your time and be careful. MLX asks you to retype a line if you make a mistake. When you finish, you return to the menu. Press S to save the file. Use the name SPEEDSCRIPT2, since this is the filename which Program 1 looks for.

After you've typed in the programs (you may want to make backup copies of them on another disk for security), follow these step-by-step instructions:

1. Load and run the ProDOS "Filer" system utilities package, or—if you have an Apple IIc—boot up the ProDOS *System Utilities* disk.

2. From the Filer main menu, select option V ("Volume Commands"); then from the Volume Commands menu, select option F ("Format a Volume"). If you are using the IIc, select option 6 ("Format a Disk") from the *System Utilities* menu. Insert a blank disk into the drive and format it for use with ProDOS. Type in SPEED.DATA for the volume name, or just press RETURN when asked for the volume name.

3. Select option F ("File Commands") from the Filer main menu, then option C ("Copy Files") from the File Commands menu—or choose option 1 ("Copy Files") from the IIc *System Utilities* menu—to copy the file named PRODOS from the ProDOS master disk to your newly formatted ProDOS disk.

4. Now copy the DOS 3.3 version of *SpeedScript* to the newly formatted disk. Even if you typed in *SpeedScript* and saved it on a ProDOS disk, go ahead and copy it on this disk for convenience. Important: Make sure *SpeedScript* is saved on the ProDOS disk with the filename SPEEDSCRIPT.

5. Copy ProDOS Converter Programs 1 and 2 onto the same disk with SPEEDSCRIPT. You can name Program 1 anything you like. We used the name PRODOS.MAKER.

Be sure that the data from Program 2 (entered with Apple MLX) is named SPEEDSCRIPT2.

6. Verify that the disk contains the following files:

PRODOS	*The ProDOS operating system*
SPEEDSCRIPT	*The DOS 3.3 version of* **SpeedScript**
PRODOS.MAKER	*Program 1, the BASIC ProDOS Converter program*

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SPEEDSCRIPT2 *The ProDOS Converter binary file (from Program 2)*

7. You're now ready to convert the DOS 3.3 version of *SpeedScript* to ProDOS. Run Program 1 (PRODOS.MAKER). It reads the file SPEEDSCRIPT, merges it with SPEEDSCRIPT2, makes some modifications, then permits you to switch disks before it saves a new file called SS.SYSTEM. We recommend leaving the same disk in the drive the first time you perform the conversion process. Later, you can use ProDOS Converter to create additional copies of ProDOS *SpeedScript* on other disks, or simply copy the file SS.SYSTEM onto a backup disk with the "Copy Files" utility. If you want the backups to be *SpeedScript* startup disks, make sure each disk contains ProDOS and does *not* have the file BASIC.SYSTEM on it. (Otherwise, BASIC.SYSTEM will take priority over SS.SYSTEM, and SS.SYSTEM will not boot up automatically.)

8. Your new ProDOS *SpeedScript* disk is now ready to boot up. Just insert the disk and turn on your computer—*SpeedScript* automatically loads and runs. To run *SpeedScript* after you've already booted up from another ProDOS startup disk, just enter -SS.SYSTEM. The hyphen (-) is the "smart load" command.

Using ProDOS *SpeedScript*

The ProDOS version of *SpeedScript* varies only slightly in operation from the original DOS 3.3 version. Because ProDOS is stored in the upper 16K of memory, and because BASIC.SYSTEM is not needed for *SpeedScript*, you have about 10K more text memory in ProDOS than you do with DOS 3.3.

All changes are to support ProDOS filename conventions. CTRL-C still displays a disk catalog. But the filename convention for Load, Save, and the G (goto file) printing command has changed. If you boot *SpeedScript* off its own startup disk, it remembers the volume name of the disk it was booted from. You don't have to enter a volume name to load, save, or link to a file on that disk. Just enter any legal ProDOS filename. Remember that—unlike DOS 3.3—spaces are not allowed in ProDOS filenames. Using spaces in a filename courts disaster.

To access any other disk, though, you'll have to enter the volume name. For example, if the volume name is BLANK27, and you want to load the file named SPROITZ, you'd enter /BLANK27/SPROITZ at the LOAD: prompt. Just surround the volume name with slashes. If you have two drives, ProDOS automatically searches for the indicated volume name on both drives.

There is one additional difference for the ProDOS version: The DOS 3.3 "*SpeedScript* File Converter" program (Program 2 from the June article) will not work with ProDOS *SpeedScript* files. That program was designed to change Apple text files into *SpeedScript* documents, and vice versa. Instead, you must use the ProDOS version presented as Program 3, below. Refer to p. 121 of the June 1985 issue of COMPUTE! for instructions on using the File Converter program.

Program 1: ProDOS Converter, BASIC Loader

Please refer to the "Apple Automatic Proofreader" article in this issue before entering this listing.

```
52 100 D$ = CHR$ (4)
BE 110 PRINT "LOADING MLX FILES"
89 120 PRINT D$;"BLOAD SPEEDSCRIPT,A$2032"
13 130 PRINT D$;"BLOAD SPEEDSCRIPT2,A$3AF0"
2F 140 PRINT "READING DATA STATEMENTS"
E4 150 FOR I = 632 TO 641: POKE I + 8192,234: NEXT
A3 160 C = 0: READ I: IF I = -1 THEN 190
1D 170 READ L: FOR I = I TO I + L: READ A:C = C + A: POKE I + 8192,A: NEXT : READ CS: IF C <> CS THEN 310
A8 180 GOTO 160
F7 190 C = 0
9E 200 READ I: IF I = -1 THEN 220
B2 210 READ A:C = C + A: POKE I + 8192,A: GOTO 200
1C 220 READ CS: IF C <> CS THEN 310
F7 230 PRINT "INSERT DISK TO RECEIVE SS.SYSTEM": PRINT " PRESS ANY KEY WHEN READY": GET A$
66 240 PRINT "SAVING SS.SYSTEM"
AA 250 DNERR GOTO 270
DB 260 PRINT D$;"DELETE SS.SYSTEM"
68 270 DNERR GOTO 0
CB 280 PRINT D$;"CREATE SS.SYSTEM,TSYS"
7E 290 PRINT D$"BSAVE SS.SYSTEM, A$2000,L$1CBF,TSYS"
0A 300 PRINT "SUCCESSFULLY CONVERTED. BOOT DISK TO RUN": END
B5 310 PRINT "ERROR IN DATA STATEMENTS": END
7E 320 DATA 0,49
78 330 DATA 160,0,185,0,32,153
6F 340 DATA 0,144,200,208,247,76
E8 350 DATA 14,144,169,32,133,251
5F 360 DATA 169,50,133,250,169,B
ED 370 DATA 133,253,169,0,133,252
0E 380 DATA 177,250,145,252,200,208
BD 390 DATA 249,230,251,230,253,165
DB 400 DATA 253,201,37,208,239,76
FF 410 DATA 0,B,7499
35 420 DATA 2B62,5
62 430 DATA 32,194,34,76,B3,20
AF 440 DATA 439
BE 450 DATA 3136,5
31 460 DATA 32,B2,35,76,57,20
24 470 DATA 302
51 480 DATA 472B,5
6E 490 DATA 32,B2,35,76,11B,26
2B 500 DATA 369
B1 510 DATA -1
85 520 DATA 643,36,651,175,656,176
17 530 DATA 661,1B4,2953,76,2954,15B
32 540 DATA 2955,35,3332,76,3333,1B4
58 550 DATA 3334,35
5B 560 DATA -1,1135
```

Program 2: ProDOS Converter, Binary File

Please refer to the "Apple MLX" article in the June 1985 issue before entering this listing.

```
START ADDRESS:  3AF0
END ADDRESS:    3CBF

3AF0: 45 32 31 03 20 00 BF C1 2D
3AF8: 54 24 20 60 14 20 00 BF BB
3B00: C0 57 24 B0 55 20 00 BF 27
3B08: CB 63 24 B0 4D AD 6B 24 61
3B10: BD 6A 24 BD 6F 24 BD 77 E3
3B18: 24 AD 55 1E 3B ED 46 1E BC
3B20: BD 6B 24 BD 72 24 AD 56 6B
3B28: 1E ED 47 1E BD 6C 24 BD E7
3B30: 73 24 AD 46 1E BD 70 24 AF
3B38: AD 47 1E BD 71 24 20 00 50
3B40: BF D0 69 24 B0 14 20 00 50
3B48: BF CB 6E 24 B0 0C 20 00 97
3B50: BF CC 76 24 B0 04 20 96 57
3B58: 14 60 BD AB 1E 20 96 14 10
3B60: A9 00 BD 77 24 20 95 FE A0
3B68: 20 00 BF CC 76 24 20 A6 DE
3B70: 0A A9 B5 A0 24 20 D5 09 67
3B78: AD AB 1E 20 DA FD A2 FA B5
3B80: 9A 4C 1B 0B 20 60 14 20 D5
3B88: 00 BF CB 63 24 B0 CB AD 67
3B90: 6B 24 BD 79 24 BD 7E 24 06
3B98: BD 77 24 20 00 BF D1 7B 55
3BA0: 24 B0 B7 AD 7A 24 BD B1 2B
3BA8: 24 AD 7B 24 BD B2 24 A5 B2
3BB0: FB BD 7F 24 A5 FC BD B0 77
3BB8: 24 20 00 BF CA 7D 24 B0 BA
3BC0: 99 20 00 BF CC 76 24 B0 41
3BC8: 91 AE 7A 24 AC 7B 24 60 41
3BD0: A0 00 B9 B3 1E 29 7F 99 35
3BD8: AC 1E CB CC 5B 1E D0 F2 E2
3BE0: BC AB 1E 60 BD AB 1E 4C F5
3BE8: 2E 23 20 00 BF C5 46 24 09
3BF0: B0 F2 A0 00 AD 00 BE 29 A4
3BF8: 0F BD AB 1E B9 01 BE 99 9A
3C00: AD 1E CB CC AB 1E D0 F4 29
3C08: CB BC AB 1E A9 2F BD AC 31
3C10: 1E 20 00 BF CB 63 24 B0 68
3C18: CB A9 AF 20 ED FD 20 00 B0
```

```
3C20: BF CA 4A 24 B0 BE A9 B9 44
3C2B: B5 D7 A9 04 B5 D6 A0 00 97
3C30: B1 D6 C9 00 D0 0B CB B1 5A
3C3B: D6 F0 34 4C 29 24 BD E5 7E
3C40: 1E 29 0F AA EB BE 5B 1E EE
3C4B: CB B1 D6 09 B0 20 ED FD 5B
3C50: CB CC 5B 1E D0 F3 A9 BD B4
3C5B: 20 ED FD A9 27 1B 65 D6 F1
3C60: B5 D6 A5 D7 69 00 B5 D7 BI
3C6B: C9 BB F0 B2 4C FC Z3 20 BA
3C70: 00 BF CC 52 24 4C DA 14 B3
3C7B: 02 60 00 BE 04 01 00 B9 D3
3CB0: 00 02 00 00 01 01 01 AB 33
3C8B: 1E 07 AB 1E C3 06 00 00 5F
3C90: 01 00 00 00 00 03 AB 1E 0B
3C9B: 00 BB 00 02 00 00 00 00 20
3CA0: 04 00 00 00 00 00 00 00 1B
3CAB: 01 00 02 00 00 00 00 04 E5
3CB0: 00 00 00 00 00 00 00 C5 EE
3CBB: D2 D2 CF D2 A0 A3 00 00 0A
```

Program 3: *SpeedScript* File Converter (ProDOS Version)

Please refer to the "Apple Automatic Proofreader" article in this issue before entering this listing.

```
4A 10 HDME
52 20 D$ = CHR$ (4)
25 40 PRINT "DD YOU WANT TD:"
A6 50 PRINT " (1) MAKE A SPEEDSC
      RIPT FILE INTD A TEXT
      FILE"
AE 60 PRINT " (2) MAKE A TEXT FI
      LE INTD A SPEEDSCRIPT
      FILE"
67 70 GET A$:A = VAL (A$)
47 B0 IF A < > 1 AND A < > 2 THE
      N 70
65 90 DN A GDTD 100,200
53 100 PRINT "ENTER SPEEDSCRIPT
      FILE NAME": INPUT ":";A$
B9 110 PRINT "ENTER TEXT FILE NA
      ME TD CREATE": INPUT ":";
      B$
7E 120 PRINT D$;"BLDAD ";A$;",A$
      2000"
A4 125 L = PEEK (4BB59) + PEEK (
      4BB60) * 256 + B192
5A 150 FOR I = B192 TD L - 1
39 160 IF PEEK (I) = 60 THEN POK
      E I,141
09 1B0 NEXT
C9 190 PRINT D$;"CREATE ";B$;",T
      TXT"
F5 195 PRINT D$;"BSAVE ";B$;",A$
      2000,E";L - 1;",TTXT"
B7 196 END
6D 200 PRINT "ENTER TEXT FILE NA
      ME": INPUT ":";B$
A6 210 INPUT "ENTER SPEEDSCRIPT
      FILE NAME TD CREATE   :";
      A$
25 220 PRINT CHR$ (4);"BLOAD ";B
      $;",A$2000,TTXT"
93 230 L = PEEK (4BB59) + PEEK (
      4BB60) * 256 + B192
59 240 FDR I = B192 TO L - 1
1A 245 IF PEEK (I) = 141 THEN PO
      KE I,60
06 260 NEXT
4A 295 PRINT D$;"BSAVE ";A$;",AB
      192,E";L - 1
B4 296 END
```

The Apple version of *SpeedScript 3.0*, and all other Apple programs in the June 1985 issue, may be ordered on disk directly from COMPUTE! Publications. Call **TOLL FREE 1-800-334-0868** (in NC 1-919-275-9809) to charge your order 8:30 a.m.–7:00 p.m. Eastern Time, Monday through Friday. Or send check or money order ($12.95 plus $2.00 shipping and handling) to:

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Greensboro, NC 27403 USA

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Apple Automatic Proofreader

Tim Victor, Editorial Programmer

Now it's easier than ever to enjoy COMPUTE! *programs for Apple II-series computers. Our "Automatic Proofreader" utility, formerly available only for Commodore, Atari, and IBM computers, has now been adapted and enhanced for the Apple II+, IIe, and IIc with either DOS 3.3 or ProDOS. The Automatic Proofreader alerts you to most typing mistakes you might make while entering a* COMPUTE! *program.*

Beginning this month, there will be an extra two-digit hexadecimal number at the start of each program line in Applesoft BASIC program listings. This extra number is a *checksum* to be used with the "Apple Automatic Proofreader" utility. When you type in a program using the Automatic Proofreader, you can check for typing errors by comparing checksums instead of reading each line and comparing it, character by character, with the listing. The Proofreader and your computer do most of the work for you.

The Automatic Proofreader loads a short machine language routine into memory and attaches it to your Apple's operating system. Each time you press RETURN to enter a program line, this routine displays a two-digit checksum at the top of your screen. If you've typed the line correctly, the checksum on your screen matches the one in the printed listing—it's that simple. You don't have to use the Proofreader to enter listings, but doing so greatly reduces the chance of making a typo.

Getting Started

First, type in the Apple Automatic Proofreader program following this article. The Proofreader can't check itself before it's done, so you'll have to be extra careful to avoid mistakes. This chore might go a little faster if you remind yourself that this is the last time you'll have to do it.

The Proofreader checks which operating system you're running before it hooks up the checksum routine, so you can type it in with either DOS 3.3 or ProDOS. If you want to use the Proofreader with both operating systems, you won't have to retype it. All you need is a utility to copy a file between disks with different formats, such as the one provided on the ProDOS *System Utilities* disk.

As soon as you finish typing the Proofreader, save at least two copies. This is very important, because the Proofreader erases the BASIC portion of itself when you run it, leaving only the machine language portion in memory.

Now type RUN and hit RETURN. The Proofreader clears the screen, loads the machine language routine, displays the message PROOFREADER ACTIVATED, erases the BASIC portion of itself, and ends. If you type LIST and press RETURN, you'll see that no BASIC program is in memory. The computer is ready for you to type in a new BASIC program.

Entering Programs

Once the Proofreader is activated, you can begin typing in a BASIC program as usual. Every time you finish typing a line and press RETURN, the Proofreader displays a two-digit checksum number in the upper-left corner of the screen. Compare this checksum with the checksum printed next to the corresponding line in the program listing. If the numbers match, you can be pretty certain the line was typed correctly. Otherwise, check for your mistake and type the line again.

A common mistake when entering BASIC programs on the Apple occurs when you accidentally press a key while holding down the control (CTRL) key. This adds an invisible control character to the line you are typing. If you don't find it before you run the program, this stray character may cause a syntax error or other mysterious behavior. Fortunately, the Proofreader detects the presence of these invisible control characters, displaying a checksum that doesn't match the one in the listing. So it's always a good idea to retype a line if the checksums don't match, even though you might not see any difference in the lines themselves.

The Proofreader ignores space characters, so you can omit spaces between keywords and still see a matching checksum. Spaces are important only between the quotation marks of PRINT statements or string assignments. If you accidentally type too many spaces or leave some out, this is the only mistake the Proofreader won't catch. For this reason, you should be extra careful when entering text within quotes.

Before running another BASIC program, it's a good idea to turn off the Proofreader by holding down CTRL while pressing the RESET button. The machine language part of the Proofreader is kept in memory starting at address 768 ($300 hexadecimal). This location is out of BASIC's way, but a lot of other programs use this same place for their machine language subroutines. Disable the Proofreader to avoid conflicts.

Abbreviated instructions on using the Proofreader—and a listing of the Proofreader program itself—will appear each month in the section "COMPUTE!'s Guide to Typing In Programs."

How It Works

When the Applesoft BASIC interpreter needs to get a line of input from the keyboard, it calls a machine language routine in the Apple's Read Only Memory (ROM) called GETLN. GETLN, in turn, calls the operating system to get a single keypress, which it stores in an input buffer. If the RETURN key was pressed, GETLN ends, leaving one new line for the BASIC interpreter in the input buffer. Otherwise, it repeats the process, asking for another keypress.

The operating system normally gets individual keystrokes from a ROM routine called KEYIN, but the Proofreader changes this. When the Proofreader is installed, the operating system calls the checksum routine instead, and the checksum routine asks KEYIN for a character. If any key other than RETURN was pressed, the checksum routine just passes it on to the operating system, which gives it to GETLN. But if RETURN was pressed, the checksum routine examines the contents of GETLN's input buffer, which now contains an entire line of input, to calculate the checksum that it displays at the top of the screen.

One very common typing mistake is transposition: typing two successive characters in the wrong order, like PIRNT instead of PRINT. A checksum program that merely adds the codes of the characters in a line can detect only the presence or absence of a character, not transposition errors. The Commodore and Atari versions of the Automatic Proofreader—the first Proofreaders introduced—have this problem. Because the Apple Proofreader uses a more sophisticated formula to compute checksums, it alerts you to transposed keystrokes. Other versions of the Proofreader could be upgraded, but this would mean that checksums in previously published listings would be incompatible with the new Proofreader.

The Apple Automatic Proofreader detects almost every possible typing mistake, including transpositions, missing or extra characters, accidental control characters, and incorrect line numbers. Typing COMPUTE! programs into your Apple computer has never been easier.

Apple Automatic Proofreader

```
10 C = 0: FOR I = 768 TO 768 +
   68: READ A:C = C + A: POKE I
   ,A: NEXT
20 IF C < > 7258 THEN PRINT "ER
   ROR IN PROOFREADER DATA STAT
   EMENTS": END
30 IF PEEK (190 * 256) < > 76 T
   HEN POKE 56,0: POKE 57,3: CA
   LL 1002: GOTO 50
40 PRINT CHR$ (4);"IN#A$300"
50 POKE 34,0: HOME : POKE 34,1:
    VTAB 2: PRINT "PROOFREADER
   INSTALLED"
60 NEW
100 DATA 216,32,27,253,201,141
110 DATA 208,60,138,72,169,0
120 DATA 72,189,255,1,201,160
130 DATA 240,8,104,10,125,255
140 DATA 1,105,0,72,202,208
150 DATA 238,104,170,41,15,9
160 DATA 48,201,58,144,2,233
170 DATA 57,141,1,4,138,74
180 DATA 74,74,74,41,15,9
190 DATA 48,201,58,144,2,233
200 DATA 57,141,0,4,104,170
210 DATA 169,141,96
```

©

Moving Memory With ROM For 64 and VIC-20

Thomas Henry

Add zing to BASIC programs on your Commodore 64 or VIC-20 by calling machine language routines built into the computer's operating system. This article shows how to use machine language block move routines from BASIC.

You may not realize it, but your Commodore computer has a treasure trove of built-in machine language routines stored in ROM (Read Only Memory). The computer's ROM operating system is actually a large machine language program with numerous subroutines—each performing a different task such as displaying characters, opening or closing files, and so on. While they're designed for internal use, many of these routines can be used in BASIC programs, too.

One very useful ROM routine performs a *block move* of memory, transferring the contents of one area of memory to a new location. The system calls this routine whenever you add a line in the middle of a BASIC program: To clear space for the new line, all of the program lines above the insertion point are moved to higher memory locations. The upper part of the program shifts upward as one large chunk or block, hence the name block move. Since the ROM routine is written in machine language, it can move thousands of bytes in less than one blink of the cursor.

What other times are block moves useful? In word processing and database management it's often necessary to shift blocks of data from one location to another. Adding a sentence while word processing is much like adding a line in BASIC: Everything above the insertion point has to move up.

Block moves are also handy in graphics applications. The usual first step in redefining characters is to copy the existing character set from ROM into RAM where it can be altered. Moving the 2048-byte character set takes about 30 seconds in BASIC, and less than a second with the ROM routine.

Want to modify the BASIC on your 64? The first step is to copy all 8K of BASIC ROM into underlying RAM, another case where a machine language block move saves a lot of time.

Putting ROM To Work

Program 1 demonstrates how to use the ROM block move routine from BASIC. Commodore 64 users should enter and save the program exactly as listed. If you are using a VIC-20, change the number in line 10 to 50156. When you run Program 1, it prompts you to enter three values: the starting and ending addresses of the block you want to move (source block), and the starting address of the location where you want the block to go (the destination block).

Let's try a simple, graphic example: moving a block of low memory upward into screen memory to make it visible on the screen. Clear the screen by pressing SHIFT-CLR/HOME. If you are using a Commodore 64, enter the following line in direct mode (with no line number) and press RETURN:

```
FOR J=55296 TO 56295:POKE
J,1:NEXT
```

If you're using an unexpanded VIC or one with 3K memory expansion, enter this line in direct mode:

```
FOR J=38400 TO 38905:POKE
J,0:NEXT
```

For a VIC with 8K or more expansion, use the following instead:

```
FOR J=37888 TO 38393:POKE
J,0:NEXT
```

Run Program 1 and enter the following values in response to the three prompts:

	START	END	NEW
64	0	999	1024
VIC (unexpanded)	0	505	7680
VIC (8K or more expansion)	0	505	4096

The screen fills with characters from the lowest 1,000 bytes (506 bytes on the VIC) of the computer's memory. The block move itself is nearly instantaneous—the bytes are transferred in less time than the BASIC program takes to perform the preliminary calculations.

Adding To BASIC

This program is easy to incorporate as a subroutine in your own BASIC programs. The variables S, E, and N represent the source block starting address, source block ending address, and new destination starting address, respectively. All that's needed is to replace the three

INPUT statements with statements that define these variables directly (S=24576 or whatever) and add a RETURN statement at the end.

Note that line 30 adds 1 to the source block ending address (E). Since the ROM routine does not copy the last byte of the source block, you must always add one to this address. The variable L is the length of the source block, computed by subtracting S from E. Lines 60–80 of the program convert the three addresses into the low byte/high byte format used by the microprocessor when executing machine language. Line 120 enters the ROM routine at the correct spot in cases where the starting address is a multiple of 256 (located on an even memory page boundary).

Lines 90–110 pass the low byte/high byte addresses to the ROM routine by POKEing them into appropriate locations. Locations 781 and 782 pass the destination block starting address to the ROM routine via the microprocessor's X and Y registers. Since the program added 1 to the source block ending address, line 100 adds 1 to the destination block ending address as well.

Direction Is Critical

When the source and destination areas do not overlap, you're free to use the ROM routine for either upward or downward moves. When the two areas overlap, however, you must consider the *direction* of the move, and transfer bytes in the proper order.

To illustrate, let's say you want to move a five-byte block upward one byte in memory, from locations 300–304 to locations 301–305. If you start moving bytes from the bottom of the source block, the byte in location 300 is moved to location 301. Then the byte in 301 moves into 302, and so on. Can you see what will happen? The byte in 300 is copied or "rippled" all the way up the block.

To avoid this problem, the ROM routine always starts with the last (highest) byte of the source block and copies downward. In the above example, the ROM routine will start at the highest byte of the source block (304) and transfer it to location 305, the top of the destination block. Then the byte in 303 would be copied into 304, and so forth until every byte has been moved.

Moving Downward

Transferring bytes in top-to-bottom order is fine for upward moves, but unsuitable for downward moves of overlapping blocks. In that situation the ROM routine will just ripple higher bytes into lower ones (remember, this only matters when the blocks overlap).

Unfortunately, the ROM does not contain a downward move routine that works for general memory transfers. When a BASIC program line is deleted, the top of the program is moved down over the deleted line. But the ROM code that does this job can't be called as a separate routine, and is useful only for moving linked BASIC lines.

To solve this problem, Program 2 creates a machine language routine that moves overlapping blocks of memory downward without rippling. Since the machine language is relocatable, you can put the routine in any other suitable location by changing the address in line 5. The same address-storing locations are used as in Program 1; follow the directions outlined above.

Note that this routine will not move blocks correctly within zero page (the lowest 256 bytes of memory). That's not a serious limitation, since it's hard to think of a reason to move zero page memory *downward*. To move zero page memory upward, use the routine in Program 1.

The more you work with these routines, the more uses you'll find for them. For example, the rippling effect described above is undesirable when you want to move a correct copy of one memory block to another location. But you can take advantage of the rippling effect to fill a large block of memory with identical values.

Clearing a high-resolution graphics screen on the Commodore 64, for instance, requires putting 8,000 consecutive zero bytes in memory. It takes a mighty long time to do 8,000 POKEs in BASIC, but the ROM routine in Program 1 can clear the screen in no time. Simply POKE a zero into the highest byte of the hi-res screen, set the starting and ending addresses to shift a block of 7,999 bytes downward one byte from the top, and SYS to the routine.

Please refer to "COMPUTE!'s Guide to Typing In Programs" before entering these listings.

Program 1: ROM Block Move

```
10 D=41964:REM CHANGE TO 50156
   FOR VIC                    :rem 27
20 INPUT "START";S            :rem 82
30 INPUT "END{2 SPACES}";E:E=E
   +1                         :rem 235
40 INPUT "NEW{2 SPACES}";N
                              :rem 171
50 L=E-S:EN=L+N               :rem 130
60 A%=L/256:A=L-256*A%:rem 127
70 B%=(EN-A)/256:B=EN-256*B%-A
                              :rem 62
80 C%=(E-A)/256:C=E-256*C%-A
                              :rem 166
90 POKE781,A%+1:POKE782,A
                              :rem 157
100 POKE91,C%:POKE90,C:rem 255
110 POKE89,B%:POKE88,B :rem 12
120 IFA=0THENSYS(D+7):END
                               :rem 6
130 SYS(D)                    :rem 40
```

Program 2: Downward Block Move

```
5 D=828:REM ML IS RELOCATABLE,
   CHANGE 828 TO NEW ADDRESS
                              :rem 208
10 FORJ=DTOD+18:READA:POKEJ,A:
   NEXT                       :rem 190
20 INPUT"START";S:S=S-1
                              :rem 205
30 INPUT"END";E               :rem 142
40 INPUT"NEW";N:N=N-1  :rem 28
50 L=E-S                      :rem 179
60 A%=L/256:A=256-L+256*A%
                               :rem 71
70 IFA=256THENA=0:A%=A%-1
                              :rem 143
80 B%=(N-A)/256:B=N-256*B%-A
                              :rem 181
90 C%=(S-A)/256:C=S-256*C%-A
                              :rem 195
100 POKE781,A%+1:POKE782,A
                              :rem 197
110 POKE91,C%:POKE90,C  :rem 0
120 POKE89,B%:POKE88,B :rem 13
130 SYSD                      :rem 215
140 DATA177,90,145,88,200,208,
    249,230,91,230    :rem 172
150 DATA89,177,90,145,88,202,2
    08,242,96         :rem 200
```

Improving The Atari's Alphabet

Rhett Anderson

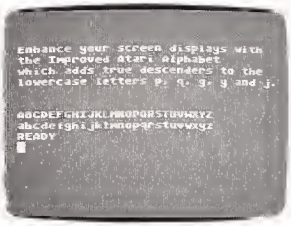
Add true descenders to lowercase screen characters with this short program for the Atari 400, 800, XL, and XE computers.

As you've probably noticed, some of the Atari's lowercase characters look a little strange on a TV or monitor screen. In most printing, the lowercase characters p, g, q, j, and y all have tails—known as *descenders*—that drop below the baseline of type. Lowercase descenders help the eye distinguish these characters from others, and produce a more balanced visual effect.

On Atari and other home computers, however, lowercase characters do not have true descenders. The descender is there, all right, but it doesn't reach below the actual baseline. Instead, the entire character is shifted upward, making it harder to read. (Some inexpensive printers also have false descenders.)

To improve your Atari's alphabet, type in and save the demonstration program below. When you run it, your screen text will have true lowercase descenders as shown in the photo. You can then load and run other BASIC programs to take advantage of the improved character set. The same technique can be used to improve readability in a text adventure program, BASIC word processor, or any application that displays a lot of text on screen. However, if the other BASIC program uses machine language subroutines or a special character set of its own, it may not be compatible with this utility.

Incidentally, the Atari version of the *SpeedScript 3.0* word processor (COMPUTE!, May 1985), written entirely in machine language, includes true lowercase descenders as a built-in feature.



True lowercase descenders make Atari screen displays more readable.

ANTIC Mode 3

The demonstration program redefines half of the standard character set and uses ANTIC mode 3 to gain an effective character resolution of 8 × 10 pixels (characters are normally 8 × 8 pixels in size). ANTIC mode 3 obtains this extra resolution by reducing the number of lines on the screen. Only 19 lines of text can be displayed rather than the usual 24 lines as in graphics mode 0.

However, the operating system still behaves as though 24 lines are available; as a result, five lines of information are lost. The program solves this problem in lines 140–160, which eliminate the bottom five lines of the graphics 0 display. Since many BASIC programs introduce new text at the bottom of the screen and scroll upward, you may find it preferable to eliminate the top five lines of text. This can be done by adding the following lines to the program:

```
PK 130  M=PEEK(A+4)+PEEK(A+5)
        *256+200
LL 131  H=INT(M/256):L=M-H*25
        6
FL 132  POKE A+4,L:POKE A+5,H
```

When redefining the character set, it's necessary to move the character data from ROM into RAM where it can be altered. Lines 30–90 of the demonstration program do this with a short machine language routine taken from COMPUTE! Books' *Mapping the Atari.*

Improved Atari Alphabet

Please refer to "COMPUTE!'s Guide to Typing In Programs" before entering this listing.

```
NJ 5 REM MOVE CHARACTER SET
EM 10 DIM BYTE$(80)
JA 20 MEM=PEEK(106)-4:POKE 1
      06,MEM-1:CHACT=MEM*256
      :GRAPHICS 0
LF 25 PRINT :PRINT :PRINT "
      (11 SPACES)PLEASE WAIT"
NN 30 FOR LOOP=1 TO 32:READ
      PGM:BYTE$(LOOP,LOOP)=C
      HR$(PGM):NEXT LOOP
JO 40 DATA 104,104,133,213,1
      04,133,212
KH 50 DATA 104,133,215,104,1
      33,214,162
OI 60 DATA 4,160,0,177,212,1
      45,214
KM 70 DATA 200,208,249,230,2
      13,230,215
DJ 80 DATA 202,208,240,96
OF 90 Z=USR(ADR(BYTE$),224*2
      56,CHACT)
DP 100 REM ALTER DISPLAY LIS
      T
CG 120 A=PEEK(560)+PEEK(561)
      *256
PL 130 POKE A+3,67
OF 140 FOR I=A+26 TO A+24 ST
      EP -1
FJ 150 POKE I,PEEK(I+5)
BP 160 NEXT I
CM 170 FOR I=A+6 TO A+23:POK
      E I,3
CB 180 NEXT I
HA 190 REM READ LOWER CASE L
      ETTERS
KH 200 FOR I=97 TO 122
AL 210 FOR J=0 TO 7
IJ 220 READ K:POKE CHACT+I*8
      +J,K
BO 230 NEXT J
BO 240 NEXT I
OF 241 FOR J=511 TO 0 STEP -
      1:POKE CHACT+J,PEEK(C
      HACT+J-1):NEXT J
```

```
PC 244 FOR J=216 TO 223:POKE
        CHACT+J,PEEK(CHACT+J
       +1)
DK 245 POKE CHACT+J-120,PEEK
       (CHACT+J-119):NEXT J:
       POKE CHACT+224,0:POKE
        CHACT+104,0
PD 250 REM POINT CHBAS TO PR
       OPER PAGE
HG 260 POKE MEM-1,0:POKE 756
       ,MEM
AN 270 REM DATA FOR NEW LOWE
       RCASE
HH 280 DATA 0,0,0,60,6,62,10
       2,62
HL 290 DATA 0,0,96,96,124,10
       2,102,124
IK 300 DATA 0,0,0,60,96,96,9
       6,60
KE 310 DATA 0,0,6,6,62,102,1
       02,62
NK 320 DATA 0,0,0,60,102,126
       ,96,60
KJ 330 DATA 0,0,14,24,62,24,
       24,24
DK 340 DATA 102,60,0,62,102,
       102,62,6
HE 350 DATA 0,0,96,96,124,10
       2,102,102
HK 360 DATA 0,0,24,0,56,24,2
       4,60
BP 370 DATA 102,60,6,0,6,6,6
       ,6
HP 380 DATA 0,0,96,96,108,12
       0,108,102
LD 390 DATA 0,0,56,24,24,24,
       24,60
ED 400 DATA 0,0,0,102,127,12
       7,107,99
FG 410 DATA 0,0,0,124,102,10
       2,102,102
PJ 420 DATA 0,0,0,60,102,102
       ,102,60
LG 430 DATA 96,96,0,124,102,
       102,124,96
KL 440 DATA 6,3,0,62,102,102
       ,62,6
DD 450 DATA 0,0,0,124,102,96
       ,96,96
IC 460 DATA 0,0,0,62,96,60,6
       ,124
NP 470 DATA 0,0,24,126,24,24
       ,24,14
CD 480 DATA 0,0,0,102,102,10
       2,102,62
AA 490 DATA 0,0,0,102,102,10
       2,60,24
DI 500 DATA 0,0,0,99,107,127
       ,62,54
MM 510 DATA 0,0,0,102,60,24,
       60,102
GF 520 DATA 102,60,0,102,102
       ,102,62,6
NN 530 DATA 0,0,0,126,12,24,
       48,126
HF 540 PRINT "{CLEAR}":PRINT
       :PRINT
JB 550 PRINT "Enhance your s
       creen displays with"
AF 560 PRINT "the Improved A
       tari Alphabet"
CA 570 PRINT "which adds tru
       e descenders to the"
EB 580 PRINT "lowercase lett
       ers p, q, g, y and j.
       "
PC 590 PRINT :PRINT
FE 600 FOR J=65 TO 90:PRINT
       CHR$(J);:NEXT J:PRINT
        :FOR J=97 TO 122:PRI
       NT CHR$(J);:NEXT J
```

Commodore 64 AutoPRINT

Rocky Moore

This labor-saving utility can shave off hours of tedious programming time if you write programs with lots of PRINT statements. It works on any Commodore 64.

PRINT statements can be laborious to format if you're writing a program that contains many text screens, such as those found in educational or instructional applications. You have to repeatedly list, edit, and run the program to make sure words aren't improperly broken across screen boundaries, that lines aren't scrolled out of view, and so on. Wouldn't it be nice if you could just type the text on the screen as you wish it to appear, and then have it automatically added to your program?

"Commodore 64 AutoPRINT" makes that possible. It is a machine language utility which automatically converts a screen display into PRINT statements and appends them to your own BASIC program.

To prepare AutoPRINT, type in the BASIC loader program following this article. Be sure to save a copy or two before running it for the first time because the BASIC portion of the program erases itself after it runs, leaving only the machine language portion in memory.

After you type RUN, the machine language is read from DATA statements and POKEd into memory. When the process is complete, a checksum of the data is compared to the proper total to help detect any typing errors in the DATA statements. If the values don't match, an error message is printed and the program stops. If the data is correct, the following message appears:

AUTOPRINT IS NOW LOADED LINE NUMBER INCREMENT (1-255)?

At this point, the program is waiting for you to specify the amount by which the line numbers of the successive PRINT statements created by AutoPRINT will increase. If you simply press RETURN without giving any input, the program will use an increment of 10. You should then see the following message:

TO ACTIVATE, TYPE SYS 51000 AND PRESS RETURN

Character Graphics, Too

You can load an existing BASIC program into the computer, or begin writing one from scratch. Once AutoPRINT is enabled, you're ready to create screen displays. AutoPRINT lets you move the cursor anywhere on the screen and type anything you want—and that includes text or graphics with the keyboard graphics characters. The one exception is that you should not include quote marks (") in your screen design, as these will not be handled properly. Also,

you should not press the RETURN key until you are finished designing your screen. Pressing that key signals AutoPRINT that you are ready for your screen to be converted into PRINT statements. If you wish to skip quickly to the start of the next line, use SHIFT–RETURN instead. You should not type a character in the lower right corner of the screen or type SHIFT–RETURN on the bottom line, as either of these will cause your display to scroll and probably ruin your carefully prepared screen layout.

To see how the program operates, create a simple screen display, hit RETURN, then type LIST. You'll see your screen display converted into PRINT statements as a BASIC program, or appended to your existing program. If you wish to create another display, type SYS 51000 to again activate AutoPRINT.

When you use AutoPRINT without a BASIC program in memory, the PRINT statements start at line number 100 plus the specified increment, and each successive line number is incremented by the value you specified when you activated AutoPRINT. When you use AutoPRINT to add PRINT statements to an existing program, the statements are placed at the end of the program, also with the specified increment. If you want to change the line number increment, type POKE 6,*x* (where *x* is the desired increment).

Commodore 64 AutoPRINT

Please refer to "COMPUTE!'s Guide to Typing In Programs" before entering this listing.

```
10 FOR I=51000 TO 51282:READ A
   :CH=CH+A:POKE I,A:NEXT
                          :rem 145
20 IF CH<>37572 THEN PRINT"
   {CLR}{DOWN}ERROR IN DATA":E
   ND                     :rem 238
30 PRINT "{CLR}{2 DOWN}AUTOPRI
   NT IS NOW LOADED"      :rem 232
40 A=10:INPUT "LINE NUMBER INC
   REMENT (1-255)";A:POKE 6,A
                          :rem 186
50 PRINT "TO ACTIVATE, TYPE SY
   S 51000"               :rem 141
60 PRINT "AND PRESS RETURN":NE
   W                      :rem 155
70 DATA 32,207,255,169,1,141
                          :rem 94
80 DATA 82,200,169,0,133,253
                          :rem 91
90 DATA 169,4,133,254,169,100
                          :rem 150
100 DATA 133,2,169,0,133,3
                          :rem 234
110 DATA 165,43,133,251,165,44
                          :rem 190
120 DATA 133,252,160,0,177,251
                          :rem 183
130 DATA 170,200,177,251,240,1
    9                     :rem 235
140 DATA 72,200,177,251,133,2
                          :rem 134
150 DATA 200,177,251,133,3,104
                          :rem 180
160 DATA 134,251,133,252,24,14
    4                     :rem 236
170 DATA 227,162,24,160,2,24
                          :rem 87
180 DATA 165,2,101,6,133,2
                          :rem 238
190 DATA 145,251,165,3,105,0
                          :rem 87
200 DATA 133,3,200,145,251,200
                          :rem 168
210 DATA 169,153,145,251,200,1
    69                    :rem 38
220 DATA 34,145,251,200,140,79
                          :rem 186
230 DATA 200,169,0,141,80,200
                          :rem 125
240 DATA 172,80,200,177,253,41
                          :rem 190
250 DATA 128,240,14,173,82,200
                          :rem 186
260 DATA 208,23,169,1,141,82
                          :rem 94
270 DATA 200,169,18,208,39,173
                          :rem 203
280 DATA 82,200,240,9,169,0
                          :rem 43
290 DATA 141,82,200,169,146,20
    8                     :rem 248
300 DATA 25,177,253,41,127,201
                          :rem 187
310 DATA 32,144,9,201,64,144
                          :rem 87
320 DATA 9,201,96,144,3,24
                          :rem 248
330 DATA 105,32,105,32,200,140
                          :rem 169
340 DATA 80,200,172,79,200,145
                          :rem 189
350 DATA 251,200,140,79,200,17
    2                     :rem 233
360 DATA 80,200,192,40,208,181
                          :rem 189
370 DATA 172,79,200,224,0,208
                          :rem 142
380 DATA 1,136,169,34,145,251
                          :rem 149
390 DATA 200,169,59,145,251,20
    0                     :rem 246
400 DATA 169,0,145,251,200,24
                          :rem 132
410 DATA 152,101,251,72,165,25
    2                     :rem 235
420 DATA 105,0,160,1,145,251
                          :rem 76
430 DATA 141,81,200,136,104,14
    5                     :rem 231
440 DATA 251,133,251,173,81,20
    0                     :rem 235
450 DATA 133,252,24,165,253,10
    5                     :rem 241
460 DATA 40,133,253,144,2,230
                          :rem 133
470 DATA 254,202,48,3,76,119
                          :rem 103
480 DATA 199,160,0,152,145,251
                          :rem 198
490 DATA 200,145,251,24,200,15
    2                     :rem 231
500 DATA 101,251,170,165,252,1
    05                    :rem 24
510 DATA 0,168,134,45,132,46
                          :rem 92
520 DATA 134,47,132,48,134,49
                          :rem 151
530 DATA 132,50,96,0,0,0,0
                          :rem 228
```

That's all there is to it. ©

Computers and Society

David D. Thornburg

Compilers, Interpreters, And Flow: Part 1

For the next three months, this column is going to discuss programming—not from the standpoint of the language that is used (although that will play a role), but rather from the standpoint of the relationship between the programmer and the creative programming environment. The environment in which the program is created and operates can determine our feelings about a language and even the type and complexity of the programs we write.

Most of us have written programs of our own at one time or another. In all likelihood, we've used a language like BASIC operating under a programming environment called an *interpreter*. An interpreter represents one of two major types of programming environments. The other type is called a *compiler*. From the user's perspective, these environments are quite different.

With an interpreter, you have the ability to execute a program one instruction at a time, fix mistakes on the fly, and tinker endlessly with the program with no apparent penalty in programming and testing time. When using a compiler, you typically create code with a text editor. Once the program is finished, the compiler translates the listing (called *source code*) into a form that can be executed by the computer (called *object code*). One advantage of compiled programs is that they typically run many times faster than interpreted programs. Two disadvantages are that you generally lose the ability to easily check the operation of the program step by step as it is written, and that programming mistakes are often uncovered only during compilation (a potentially lengthy process).

I think a programmer's interaction with a language can be influenced more by whether the program is compiled or interpreted than it is by the language itself. I'm not suggesting that the choice of programming language does not make a difference—it does. For example, the current interest in languages such as Logo and Pascal in education is finally allowing BASIC to take its well-deserved place in history.

The Environmental Impact

I believe the ability to establish a good sense of flow with the programming process determines the enjoyability and subsequent feeling of success when a program is completed and is functioning properly. My reasons for feeling this way come from many observations over the years. For example, one of the complaints I've heard about Logo is that it is "slow" and a "memory hog." A complaint I've heard about Apple's original Pascal is that it is a very hard programming language to use. A similar complaint has been leveled against Apple's version of PILOT (though not against Atari's version).

What are the bases of these comments? None has anything to do with the programming language itself. In fact, each deals with the programming environment—especially whether the particular version of the language being described is interpreted or compiled.

For example, Logo's reputation for slowness and inefficient memory use is a direct result of the fact that most versions of Logo operate under a highly interactive and flexible interpreter. Because Logo variables can represent many different types of data (numbers, words, lists), and Logo does not require (or allow) the user to specify the data type when defining a variable name, each use of a variable must have its type checked prior to performing an operation, and this takes time. Other time-consuming aspects of interpreted Logo have to do with the recursive nature of Logo programs and the dynamic "scoping" of variables—the manner in which Logo keeps track of values for variables that are used in different levels of a recursive procedure.

The tradeoff in Logo is one of ease of use. The structure of Logo makes it an excellent choice for creating programs ranging from expert systems to new computer languages. But, while the language itself allows programmers to express magnificent programming ideas efficiently, the operating environment associated with most versions is so cumbersome that the language is rarely used to write large programs—they just run too slowly.

A Logo Compiler

The solution is quite simple. In addition to having an interpreter for creating and testing procedures, the Logo programmer also should have access to a compiler that translates the final program into object code for rapid execution.

When I brought up this topic at the Logo 84 conference at the Massachusetts Institute of Technology last year, I argued that without a compiler, Logo would remain a "gymnasium for the mind." Unlike many people who use Logo purely as a child's introduction to programming, I need Logo to create programs that would be very difficult to write in any other language except LISP.

For reasons I have yet to understand, the established Logo vendors argued that I shouldn't want a compiler—that I should just wait for a faster interpreter. I was amused by this response, because LISP compilers have made it possible for these companies to create commercial versions of Logo in the first place.

Fortunately, one vendor has created a Logo compiler for a personal computer. Next month we'll explore the benefits of this new Logo environment. ©

The World Inside the Computer

Fred D'Ignazio, Associate Editor

Here Come The Toy Robots!

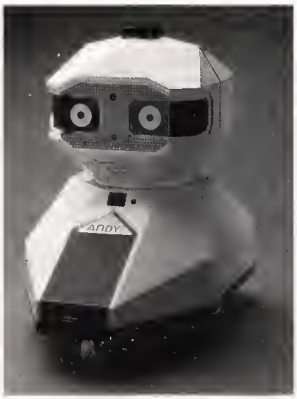
Toy Fair was a vertical conference staged this spring in three Manhattan skyscrapers, buffeted by howling, blustery winds and giant raindrops that appeared to be falling sideways. I attended Toy Fair to preview the new high-tech learning toys and robots that will appear on toy store shelves this fall. Hasbro Bradley and Tonka Toys have the most widely known robots—the Transformers and the GoBots. But there are also many other toy robots, including:

- Maxx Steele & Robo-Force Robots from CBS/Ideal Toys.
- Robotix construction kits from Hasbro.
- "Bot" family of robots from Tomy—The Pocketbots, Dingbot, Flipbot, Chatbot, Owlbot, Verbot, Omnibot, and Omnibot 2000.
- Tomy's Robo-Strux robot construction kits.
- MOVIT family of build-it-yourself robots from OWI.
- Petsters (Dogster & Catster), Compu-robot, Andy the Personality Robot, and Talkabot from Axlon.
- Elami "robot friends" from North American Robotics.

I think robot toys will become the first real robots to enter people's homes as true consumer products. Toy companies are putting their robots on the market only after extensive product testing for safety, ease of use, durability, and play value. They also realize that robots are unlike other appliances in the home and are more like toys. Today's robots have little functional value, but, as a toy, they can provide hours of enjoyment and learning. The real magic of robots is when they appear lifelike, "petlike," and loaded with personality.

The more costly robot toys, like Omnibot, HEROjr (also available in kit form), Maxx Steele, Andy, and Elami all come with distinct personalities. HEROjr is the most lovable and absent-minded of the robots. He recites nonsense rhymes, mistakes dogs and cats for humans, orders hamburgers and fries from the bathroom sink, and sings "Old MacDonald Has a Robot" to the wastepaper basket.

Children can play games like Moon Ball with Maxx Steele and teach him to play their own musical compositions. They can break dance with Omnibot (using the cassette recorder built into his chest). And they can play robot-tag with Elami and go on make-believe maze adventures like "Journey to the Crystal Mines."



Andy the Personality Robot has a programmable personality and can be controlled with a Commodore 64 or Atari home computer.

Even the inexpensive robot toys have personality. The Transformers, the GoBots, and the Robo-Force action-figure robots all have names, comic books, and heroic storylines that take children (and parents) on life-or-death missions to faraway galaxies and the remote future.

Maxx Steele is a two-foot tall robot with a 150-word vocabulary and 20 preprogrammed phrases. His claw is nearly as flexible as a human wrist.

The builder-kit robots—like the Movits, the Erector Set Maxx Steele robots, the Robo Strux, and the Robotix—are appealing because they let you and your children build a robot on your own. And, although they are challenging, the kits take only a couple of hours to assemble, and require no soldering or special skills.

Tomy's Omnibot 2000 has a remote controller and retails for about $500. ©

The Beginners Page

Tom R. Halfhill

For-Next: Part 3

In the past two columns, we've discussed how to construct FOR-NEXT loops and apply them in practical ways to automate repetitive tasks. But you might be surprised to learn that another very common use of FOR-NEXT is to make a loop which does absolutely nothing.

Sounds crazy, doesn't it? Why would anybody write a routine which does nothing? Okay, so I exaggerated a little. These kind of loops don't do *absolutely* nothing. They just make the computer idle in neutral for a few moments.

Suppose your program needs to pause for a brief period. Perhaps it is displaying a title screen, or printing instructions that are scrolling off the screen too fast for people to read. One answer is a *delay loop*:

```
10 FOR X=1 TO 1000
20 NEXT X
```

You simply insert this loop wherever you want the delay. The computer spins its wheels for 1,000 passes and then carries on. By changing the size of the loop, you can force a delay for a fraction of a second or a minute or more.

Loops Within Loops

As yet another example of the flexibility of FOR-NEXT, you can also put a loop within a loop, or even a loop within a loop within a loop within a loop. These are called *nested loops*. However, there's a rule you have to follow to avoid confusing your computer (not to mention yourself). Each related FOR and NEXT must be completely contained within the loop immediately surrounding it:

```
10 FOR X=1 TO 10
20 PRINT
30 PRINT "OUTER LOOP #";X
40 PRINT
50 FOR Y=1 TO 10
60 PRINT "INNER LOOP #";Y
70 FOR Z=1 TO 200
80 REM DELAY LOOP
90 NEXT Z
100 NEXT Y
110 NEXT X
```

This program looks so unusual that the best way to understand what's going on is simply to run it. The PRINT statements will tell you which loop is executing during each pass; notice how the inner loop executes ten times for each pass of the outer loop.

The key point here is the NEXT statements at lines 90, 100, and 110. Observe how the Z delay loop is nested completely within the Y loop, which in turn is nested completely within the X loop. If you change the order of the NEXT statements, the program won't work.

Nested loops are handy when you need to insert a delay loop within a larger loop that is doing something else too quickly. Another application is embedding a smaller repetitive routine within a larger repetitive routine. For instance, let's take another look at the checkbook routine in last month's column. It adds up all the checks written in a month:

```
10 PRINT "HOW MANY CHECKS
   THIS MONTH";
20 INPUT CH
30 FOR X=1 TO CH
40 PRINT "AMOUNT OF CHECK";
50 INPUT AM
60 SUM=SUM+AM
70 NEXT X
80 PRINT "TOTAL AMOUNT IS
   $";SUM
```

To make this routine sum up all the checks written in a year, you could simply surround it with a FOR-NEXT loop that performs 12 passes. Add or change these lines:

```
5 FOR Z=1 TO 12
8 SUM=0
80 PRINT "AMOUNT FOR MONTH
   ";Z;" IS $";SUM
90 YR=YR+SUM
100 NEXT Z
110 PRINT "TOTAL FOR YEAR IS
   $";YR
```

Line 5 begins the outer loop. Line 8 is necessary to clear out the value of SUM for each monthly calculation. Line 80 prints the total amount for each month. Line 90 creates a new variable, YR, to keep a running total of the yearly amount. Line 100 repeats the outer loop. And line 110 prints the final total of all the checks written during the year.

Next month we'll continue our discussion of FOR-NEXT by showing how to make long-legged loops and even *backward* loops. ©

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There are tricks to conserving your cash if you spend lots of time accessing commercial information services and electronic bulletin board systems (BBSs). One of the best tricks of all is a way to save money when using electronic mail and message systems. E-mail is a wonderfully fast way to send messages, assuming the person to whom you are writing checks his or her electronic mailbox regularly. But if you're a slow typist, you might as well send your letter via an overnight carrier service—it's that expensive. And even if you're a fast typist, the cost can be significant.

Why? Because information services typically charge for connect time rather than the amount of data transferred. If you spend 15 minutes or so typing in a lengthy message, it could easily cost a couple of bucks. And even a "free" BBS often requires a long-distance phone call to reach.

The problem is the way an E-mail service or message system requires you to enter text online. Most systems have what's called a *line editor*, a throwback to the early days of timesharing terminals and primitive word processors. Line editors typically allow only a certain number of characters per line and expect each line to be terminated with a carriage return (transmitted by hitting the RETURN or ENTER key on your keyboard):

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2: into a line editor might look. The numbers<CR>
3: followed by a colon on the left-hand edge<CR>
4: are sent to us by the remote computer to<CR>
5: indicate that the line editor is ready for<CR>
6: a new line of text. These indicators are<CR>
7: called prompts. Line editors usually<CR>
8: require a line with nothing but a carriage<CR>
9: return to terminate the file being typed in.<CR>
10: <CR>

Editing messages with a line editor is incredibly cumbersome, especially if you want to insert or delete blocks of text. And you can forget about such taken-for-granted word processing features as global search and replace, vertical scrolling, full-screen editing, etc.

Now here's the trick: If you write the message *before* logging on, you can upload it into the line editor in a small fraction of the time required to type it in directly. And that saves money. Many terminal programs allow you to send files one line at a time with the transmission of each line tied to a user-definable prompt. If your terminal program has such a feature, you can upload a previously prepared text file directly into the remote system's line editor.

Furthermore, if you prepare the message offline, you can use a word processor that is much more versatile than the online text editors. Just be sure the word processor stores the text in standard ASCII format to insure that the file does not contain unreadable characters. Terminate each line with a carriage return. Most online editors accept up to 80 characters per line.

Uploading The Message

After creating the text file, save it on disk, start your terminal program, and log onto the remote system. Enter the commands that bring up the line editor.

Set your terminal program for a paced line-by-line transfer keyed on the appropriate prompt character. In the above example, the prompt character is a colon (:). Then send the file, sit back, and watch as your computer quickly enters the text into the line editor for you.

Some line editors are particularly hostile; they don't even have prompts. You can usually solve this problem if your terminal software has the ability to wait for a specified period of time between lines. While not a sure thing, a delay of a second or two between lines is usually enough to insure a successful upload.

When writing your text offline, you may find it inconvenient to remember to insert a carriage return at the end of each line. Most word processors require a carriage return only to mark the end of a paragraph, not a line. But there is a way to get around this problem. Some word processors allow you to print documents to a disk file as well as to a printer. If you're careful to omit any formatting instructions that would embed escape codes in the file, the result will be just what you need—a file of pure ASCII text with a carriage return at the end of each line. You may have to experiment with margin settings to get the line lengths just right, but this trick can save you a lot of unnecessary keystrokes.

Over the past few columns, we've covered the fundamentals of uploading and downloading. If you need more help, take advantage of one of your most valuable resources. Attend a local computer user group meeting and make friends with some of the experienced telecomputing buffs. You'll find that modem aficionados tend to be an extremely gregarious bunch of folks who are always willing to help newcomers to telecomputing. ©

Donald B. Trivette

An Old-Fashioned Database

I lose telephone numbers. I scribble them on magazines, scraps of paper, counter tops—any place that's handy—but when I go back to find them....

What was once only an inconvenience has become a financial annoyance now that the phone company is charging 50 cents for long-distance directory assistance. Now that it costs more to get the number than it does to actually place some calls, I figured I might save money by using one of those desk-management programs.

These programs run usually *in the background,* which means they hide in the computer's memory until they're needed. In the meantime, you can use *Lotus 1-2-3* or *Volkswriter* or almost any other program. Then, when you want to jot down a phone number, you press an unusual key combination—say Ctrl-Shift-Alt—and your desk-management menu pops on the screen. Pops up right on top of your 1-2-3 spreadsheet or whatever you were doing. Once you've finished, everything hustles back into memory and you can pick up where you left off. Great idea.

These programs often have other features like a calculator, a notebook, a calendar, and a phone dialer. (To use the dialer, the computer must be connected to a modem and a phone line.)

I tried it, but it wasn't for me. In the first place, I wasn't usually at the computer when I wanted to make a call or write down a number. In the second place, I could look the number up and punch it out on the phone faster than I could go through all the desk-management rigmarole. And in the third place, it seemed like every time I got the cursor positioned on the number I wanted, the phone would ring. I wasn't sure whether to turn the computer off or answer the phone or what. It's amazing how a computer can make dialing a phone number so complicated, although I suppose many people probably use these programs every day and love them.

Rolodex To The Rescue

I decided the best solution to my problem was a manual database of phone numbers, such as a Rolodex. In case you've never had one, a Rolodex is a device with 2 x 4-inch cards attached to a drum so you can quickly flip from card to card. Its chief disadvantage is that after heavy use the cards wear out and must be recopied.

The Rolodex Corporation hasn't sat on its corporate hands while being challenged with newfangled computer software. Rolodex's *Compucard* program ($49.95) turns an IBM PC into an electronic Rolodex. Although this may be great for a corporate phone operator, it's no better than the desk-management software for me. Maybe worse—it doesn't run in the background.

But *Compucard* can also be used to generate and maintain an old-fashioned hardcopy Rolodex. Once you've entered all your numbers and addresses in the program, you can print them on continuous-form Rolodex cards. It's easy to make a copy for each phone, or a copy for each salesperson, or a copy for each branch office.

Compucard is not what I would call a well-designed program. For example, it's sold with a default setting that requires two disk drives. This can be changed so that the program and data can be on the same disk, but you can't make the change unless you can get the program to run in the first place, and it won't run without two drives. Is that logical?

Nevertheless, since you only need to use *Compucard* each time you generate another phone list, you can live with a few drawbacks. The program *does* make it easy to format the information on the Rolodex cards. A card outline is displayed on the screen and a simple *full-card* editor lets you enter text in a what-you-see is what-you-get manner.

Easy Updating

One nice feature of *Compucard* is that it automatically stamps two dates on each card—one for the date the record was originally entered and another for the last update. Every so often you can print out new copies of only those records most recently updated. When all the cards are worn out, it takes only a few minutes to print a new set.

Compucard lets you enter two file tabs for each record. On my Rolodex, I use one for the alphabetical name and the second for a generic classification. Which brings us to an important point about creating a database—any database.

It is essential to think through the classifications and organization of data *before* entering it. Once you've settled on a plan, test it. Use the data for a few days before you enter hundreds of records. With most database systems, it is not easy—and sometimes impossible—to change the organization and classification of the data once it's entered.

According to the book *In One Day* by Tom Parker (Houghton Mifflin, 1984), your name and my name—all our names—pop up in computer memory 35 times every day! Please don't add needlessly to the computer clutter by having your computer do things that are better done by hand. Sometimes the old methods—or the old methods with some computer assistance—are the best. ©

Programming the TI

C. Regena

Using TI Logo II

Logo is probably the most popular second language on TI computers (after BASIC). That's because *TI Logo* is a versatile, entertaining language, especially for young people. If you liked *TI Logo*, you'll like *TI Logo II* even better.

TI Logo II adds several improvements. It's compatible with any kind of printer, thermal or RS-232 (the old Logo could only use the thermal printer). *TI Logo II* uses sprites as before, but now you can make them big or small. It also has three-channel music capabilities.

You can save both procedures and custom characters on cassette or disk. *TI Logo II* requires the 32K Memory Expansion.

TI Logo II comes with a large loose-leaf binder, a 200-page manual, a *TI Sampler* booklet of procedures and educational activities, a sample disk in a vinyl loose-leaf holder, a sample cassette, and the actual *Logo* cartridge in a plastic holder that fits in the binder.

The manual has been revised since the first version of *TI Logo*. It is well illustrated and has plenty of sample procedures. Chapter 12 is a glossary of Logo Primitive Commands. If you are familiar with other versions of Logo and just need a quick reference guide, this section is a big help. There is also a one-page Keyboard Reference Guide which summarizes the key functions. If you need the details of a command, there is a comprehensive index.

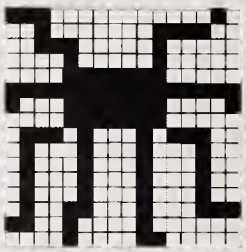
Versatile Sprite Commands

Sprites (smoothly moving screen objects) are a feature of *TI Logo* that children really enjoy. Thirty-two sprites are available. You can use the five predefined shapes, or you can create your own with MAKESHAPE. You may SETCOLOR (16 colors to choose from) and SETHEADING to position the sprite. You can move certain distances with the regular turtle commands such as FORWARD and LEFT. Or you can SETSPEED, which continuously moves an object. And you can FREEZE and THAW sprites. *Logo II* also has the commands BIG and SMALL. SMALL is the original sprite size; BIG makes them twice as large. This means greater fun with sprite animation.

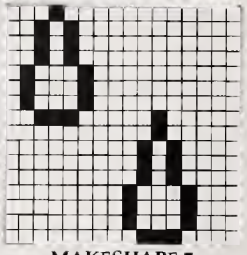
Music is the main reason I bought *TI Logo II*. Like regular *TI BASIC*, there are three voices available plus a noise generator and drum. You can execute other commands while music is playing, which enables you to synchronize the music with animated graphics.

The MUSIC command consists of numbered notes and numbers which represent the rhythm or duration of the notes. You may also SETTEMPO and choose between STACCATO and LEGATO. PM or PLAYMUSIC will play the music you have put in the music buffer with either the MUSIC command or a series of NOTE commands. You may also SET VOLUME, and of course add a DRUM rhythm accompaniment. The manual gives detailed instructions on how to use MUSIC.

The main disappointment I had with *TI Logo II* was that the sample programs that came on the disk and cassette were created with *Logo I* and did not exploit the music features. Following is a program which illustrates music and sprite animation.



MAKESHAPE 6



MAKESHAPE 7

Custom Shapes

First you want to define some custom shapes. Type MAKESHAPE 6 and copy the spider pattern. Next MAKESHAPE 7 for the other pattern. When the grid appears, use the arrow keys to move around. When you want to blacken a square, press the FCTN key as you move.

Now type in the following procedures. Feel free to use the two-letter abbreviations. SS is SETSPEED and designates how fast a sprite will go. SH is SETHEADING and points the sprite in a certain direction. CARRY indicates which shape number the sprite should be. SC is SETCOLOR for the color of the sprite. PU and PD are PENUP and PENDOWN.

To run the program, type SPIDER and press ENTER (in command mode). CS clears the screen and CM clears the music buffer. WAIT is a command to wait a certain time before executing more statements in the procedure. I used WAIT to help choreograph the graphics with the music. If you get the message OUT OF INK while the web is being drawn, simply type SPIDER again and ENTER. You may save your characters and procedures on disk or tape. To reload it later, use the command RECALL. To get a hard copy listing, use PRINTOUT.

A Few Answers

I'm going to take just a little room this month to answer some general questions I'm asked quite often. Yes, Texas Instruments still services their home computers, even though they are no longer selling them. Call 1-800-TI-CARES or write to the Lubbock, Texas address listed in your user's manual.

I still see *lots* of third-party software available. If you registered your computer when you purchased it, you should be on various mailing lists. Of course, it's a good idea to keep in touch with a user group for ongoing information (and there are still many strong user groups). Most of us who have written for the TI still love the computer and will probably continue to write for it forever.

Add-on hardware for the TI is still being developed and produced. CorComp has developed several kinds of peripherals, along with a number of other companies.

And, of course, all the COMPUTE! books for the TI are still available. If you don't see them in the larger bookstores, you may order directly from COMPUTE!.

Thanks to all of you who wrote to ask if the algebra tutorial published for the TI in the October 1984 COMPUTE! is available for the Commodore 64. The answer is now yes. I do write for a variety of computers, but this column describes the TI version only.

Spider For *TI Logo II*

```
TO CM
SETVOICE 0
SETVOICE 1
END

TD TUNE1
MUSIC [0 5 5 5 7 9 9][1 2 1 2 1
  2 2]
MUSIC [5 7 5 7 9 5][1 2 1 2 1 4]
END

TD TUNE2
MUSIC [9 9 10 12 12 10 9 10 12 9
  ][2 2 1 2 2 2 1 2 1 4]
END

TD SUN
TELL SPRITE 9
CARRY :BALL
SS 0 SH 0 FD 80 LEFT 90 FD 100
SC 10
END

TD WEB
REPEAT 8 [FORWARD 45 BACK 45 RIG
  HT 45]
HOME FORWARD 20
RIGHT 120 FORWARD 15
REPEAT 3 [RT 30 FD 15 RT 60 FD 15]
RT 30 FD 15
PU HOME FORWARD 25 PD
RIGHT 120 FORWARD 20
REPEAT 3 [RT 30 FD 19 RT 60 FD 19]
RT 30 FD 20
PU HOME FD 32 PD
RIGHT 120 FORWARD 24
REPEAT 3 [RT 30 FD 24 RT 60 FD 24]
RT 30 FD 25
END

TD SPIDER
CS CM
TELL :ALL
SC 0
FREEZE
HOME
TELL TURTLE
HIDETURTLE
HOME
TUNE1 TUNE2 TUNE2 TUNE1 PM
WEB
TELL SPRITE 6
CARRY 6
SH 180
FD 30
SH 0
SC 1
THAW
SS 1
TELL SPRITE 7 SS 0 HOME
CARRY 7 WAIT 200
SH 0 FD 80
SH 180 SC 4 SS 10
TELL SPRITE 8
CARRY 7 SS 0 HOME
SH 0 FD 60 LEFT 90 FD 15
SH 180 SC 4 SS 10 WAIT 60
TELL SPRITE 6 SH 180 SS 10
WAIT 60 FREEZE
TELL SPRITE 7 SC 0
TELL SPRITE 8 SC 0
WAIT 100
SUN WAIT 200
TELL SPRITE 6 SH 0 SS 2 THAW
END
```

INSIGHT: Atari

Bill Wilkinson

Bargain Basement Networking

From time to time a new product comes to my attention which stands above the rest in terms of performance and value. A recent example is the MicroNet from Micro Peripheral Products (MPP) of Albany, Oregon. The MicroNet is a wondrously simple device that allows you to connect up to *eight* Atari computers (though not the new ST machines, yet) to a single printer and one or more disk drives. You simply connect a standard Atari serial cable (the kind that goes from the computer to the disk drive, printer interface, etc.) from each computer to any of eight sockets on the deceivingly small MicroNet box. Then you connect a similar cable from the MicroNet to the drives and printer, just as if the MicroNet were an Atari computer. The result? All eight computers think the disk drive(s) and printer are their very own! Well . . . almost.

This is *not* a sophisticated high-speed network with several megabytes of mass storage and an automatic printer spooler online. It's still using the clunky 19,200-baud Atari serial bus, slow enough when only one computer is using a drive. With eight computers, you may have to wait eight times as long to read something from a disk (though a delay this drastic is unlikely). And what about printing? You sure don't want to use the slow Atari 1027 printer in this configuration! Still, let's take a look at situations where this system makes sense.

First and most obvious is the classroom. A teacher can put the day's lessons on a disk from any one of the computers, write-protect the disk, and then let each student boot his/her own computer and start using the appropriate materials. Or the teacher can boot each computer—it would take only two or three minutes. Reports on each student's performance could be kept on a second disk or printed on the shared printer.

The total cost of this system, assuming eight computers? Look at the chart below. Prices are rounded up from retail, and an enterprising dealer should be able to offer a substantial discount on a package like this:

8 800XL or 65XE computers	$ 800
8 color TVs or monitors	$1600
2 disk drives	$ 400
1 fast printer	$ 400
1 printer buffer	$ 200
1 MicroNet	$ 200
TOTAL	$3600

Cheaper Than Terminals

Surprised by the last two items? The printer buffer is recommended by MPP. By spooling printer data into the buffer at high speed, a single computer won't tie up the MicroNet bus for so long. And if you were surprised at the low cost of the MicroNet, you read it correctly: The actual suggested retail price is only $199.95. Hard to believe!

That puts the per-station cost at $450, less than the price of a black and white, nongraphics *terminal* on a conventional time-sharing system. Or about one-third the cost per station of an Apple IIc network system.

Could the MicroNet be used for business applications? Well, maybe. A big fat maybe. The MicroNet provides *no* file protection whatsoever. No password security. No way of stopping user No. 2 from zapping user No. 1's files. Etcetera. And there's certainly nothing to prevent two users from trying to write to the same disk file at the same time. Lots of potential problems. The easiest solution is to write software which is alert to the possible problems.

For example, the MicroNet gives exclusive control of the disk drive to a single computer long enough for it to create a file. A program running on another computer could look for the existence of that file as a signal that it could not write to a certain database file. Sounds clumsy, but many of the cheapie time-sharing systems of the 1960s and 1970s had this problem and solved it the same way.

The MicroNet system can definitely be crashed if its users are hostile, and that's one reason I suggested that teachers write-protect their master disks before letting all the clever kiddies take a crack at crashing it. (My own little seven-year-old knows that crashing a disk means he doesn't get to play on the computer for a while. He is now beautifully conscientious about popping the disk before turning off the power.)

The MicroNet is obviously an economical solution to some problems. It is not all things to all people; but, at its price, it is certainly worth looking at. (For more information, write to MPP at 225 Third Avenue SW, Albany, OR 97321.)

Next month: Part 1 of my long-promised series on Atari input/output. Theory and a little bit of practice. See you then. ©

COMPUTE!'s Guide To Typing In Programs

Before typing in any program, you should familiarize yourself with your computer. Learn how to use the keyboard to type in and correct BASIC programs. Read your manuals to understand how to save and load BASIC programs to and from your disk drive or cassette unit. Computers are precise—take special care to type the program *exactly* as listed, including any necessary punctuation and symbols. To help you with this task, we have implemented a special listing convention as well as a program to help check your typing—the "Automatic Proofreader." Please read the following notes before typing in any programs from COMPUTE!. They can save you a lot of time and trouble.

Since programs can contain some hard-to-read (and hard-to-type) special characters, we have developed a listing system that spells out in abbreviated form the function of these control characters. You will find these special characters within curly braces. For example, {CLEAR} or {CLR} instructs you to insert the symbol which clears the screen on the Atari or Commodore machines. A symbol by itself within curly braces is usually a control key or graphics key. If you see {A}, hold down the CONTROL key and press A. Commodore machines have a special control key labeled with the Commodore logo. Graphics characters entered with the Commodore logo key are enclosed in a new kind of special bracket. A graphics character can be listed as [<A>]. In this case, hold down the Commodore logo key as you type A. Our Commodore listings are in uppercase, so shifted symbols are underlined. A graphics heart symbol (SHIFT-S) would be listed as S. One exception is {SHIFT-SPACE}. Hold down SHIFT and press the space bar.

If a number precedes a symbol, such as {5 RIGHT}, {6 S}, or [<8 Q>], you would enter five cursor rights, six shifted S's, or eight Commodore-Q's. On the Atari, inverse characters (printed in white on black) should be entered with the Atari logo key. Since spacing is sometimes important, any more than two spaces will be listed, for example, as: {6 SPACES}. A space is never left at the end of a line, but will be moved to the next printed line as {SPACE}. There are no special control characters found in our IBM PC/PCjr, TI-99/4A, and Apple program listings. For your convenience, we have prepared this quick-reference key for the Commodore and Atari special characters:

Atari 400/800/XL

When you see	Type	See
{CLEAR}	ESC SHIFT <	Clear Screen
{UP}	ESC CTRL -	Cursor Up
{DOWN}	ESC CTRL =	Cursor Down
{LEFT}	ESC CTRL +	Cursor Left
{RIGHT}	ESC CTRL *	Cursor Right
{BACK S}	ESC DELETE	Backspace
{DELETE}	ESC CTRL DELETE	Delete character
{INSERT}	ESC CTRL INSERT	Insert character
{DEL LINE}	ESC SHIFT DELETE	Delete line
{INS LINE}	ESC SHIFT INSERT	Insert line
{TAB}	ESC TAB	TAB key
{CLR TAB}	ESC CTRL TAB	Clear tab
{SET TAB}	ESC SHIFT TAB	Set tab stop
{BELL}	ESC CTRL 2	Ring buzzer
{ESC}	ESC ESC	ESCape key

Commodore PET/CBM/VIC/64

When You Read:	Press:	See:	When You Read:	Press:	See:
{CLR}	SHIFT + CLR/HOME		{GRN}	CTRL + 6	
{HOME}	CLR/HOME		{BLU}	CTRL + 7	
{UP}	SHIFT + CRSR ↑		{YEL}	CTRL + 8	
{DOWN}	CRSR ↑		{F1}	f1	
{LEFT}	SHIFT + CRSR →		{F2}	f2	
{RIGHT}	CRSR →		{F3}	f3	
{RVS}	CTRL + 9		{F4}	f4	
{OFF}	CTRL + 0		{F5}	f5	
{BLK}	CTRL + 1		{F6}	f6	
{WHT}	CTRL + 2		{F7}	f7	
{RED}	CTRL + 3		{F8}	f8	
{CYN}	CTRL + 4		←	←	
{PUR}	CTRL + 5		↑	SHIFT + ↑	

The Automatic Proofreader

Also, we have developed a simple, yet effective program that can help check your typing. Type in the appropriate Proofreader program for your machine, then save it for future use. On the VIC, 64, or Atari, run the Proofreader to activate it, then enter NEW to erase the BASIC loader (the Proofreader will still be active, hidden in memory, as a machine language program). Pressing RUN/STOP–RESTORE or SYSTEM RESET deactivates the Proofreader. You can use SYS 886 to reactivate the VIC/64 Proofreader, or PRINT USR(1536) to reenable the Atari Proofreader. The IBM Proofreader is a BASIC program that lets you enter, edit, list, save, and load programs that you type. It simulates the IBM's BASIC line editor.

Using The Automatic Proofreader

Once the Proofreader is active, try typing in a line. As soon as you press RETURN, either a number (on the Commodore) or a pair of letters

(Atari or IBM) appears. The number or pair of letters is called a *checksum*. Try making a change in the line, and notice how the checksum changes.

All you need to do is compare the value provided by the Proofreader with the checksum printed in the program listing in the magazine. In Commodore listings, the checksum is a number from 0 to 255. It is set off from the rest of the line with *rem*. This prevents a syntax error if the checksum is typed in, but the REM statements and checksums need *not* be typed in. It is just there for your information.

In Atari and IBM listings, the checksum is given to the left of each line number. Just type in the program, a line at a time (without the printed checksum) and compare the checksum generated by the Proofreader to the checksum in the listing. If they match, go on to the next line. If not, check your typing: You've made a mistake. On the Commodore and Atari Proofreader, spaces are not counted as part of the checksum, and no check is made to see that you've typed in the characters in the right order. If characters are transposed, the checksum will still match the listing. Because of the checksum method used, do not use abbreviations, such as ? for PRINT. However, the Proofreader does catch the majority of typing errors most people make. The IBM Proofreader is even pickier; it *will* detect errors in spacing and transposition. Also, be sure you leave Caps Lock on, except when you need to enter lowercase characters.

Special Proofreader Notes For Commodore Cassette Users

The Proofreader resides in the cassette buffer, which is used during tape LOADs and SAVEs. Be sure to press RUN/STOP–RESTORE before you save or load a program, to get the Proofreader out of the way. If you want to use the Proofreader with tape, run the Proofreader, then enter these two lines *exactly* as shown, pressing RETURN after each one:

```
A$="PROOFREADER.T":B$="{10 SPACES}"
    :FORX=1TO4:A$=A$+B$:NEXT
FORX=886TO1018:A$=A$+CHR$(PEEK(X))
    :NEXT:OPEN 1,1,1,A$:CLOSE1
```

Then press RECORD and PLAY on a blank tape, and a special version of the Proofreader will be saved to tape. Anytime you need to reload the Proofreader after it has been erased, just rewind the tape, type OPEN1:CLOSE1, then press PLAY. When READY comes back, enter SYS 886.

IBM Proofreader Commands

Since the IBM Proofreader replaces the computer's normal BASIC line editor, it has to include many of the direct-mode IBM BASIC commands. The syntax is identical to IBM BASIC. Commands simulated are LIST, LLIST, NEW, FILES, SAVE, and LOAD. When listing your program, press any key (except Ctrl-Break) to stop the listing. If you enter NEW, the Proofreader will prompt you to press Y to be especially sure you mean yes.

Two new commands are BASIC and CHECK. BASIC exits the Proofreader back to IBM BASIC, leaving the Proofreader in memory. CHECK works just like LIST, but shows the checksums along with the listing. After you have typed in a program, save it to disk. Then exit the Proofreader with the BASIC command, and load the program into the normal BASIC environment (this will replace the Proofreader in memory). You can now run the program, but you may want to resave it to disk. This will shorten it on disk and make it load faster, but it can no longer be edited with the Proofreader. If you want to convert a program to Proofreader format, save it to disk with SAVE "filename",A.

VIC/64 Proofreader

```
100 PRINT"{CLR}PLEASE WAIT...":FORI=886TO10
    18:READA:CK=CK+A:POKEI,A:NEXT
110 IF CK<>17539 THEN PRINT"{DOWN}YOU MADE
    {SPACE}AN ERROR":PRINT"IN DATA STATEMEN
    TS.":END
120 SYS886:PRINT"{CLR}{2 DOWN}PROOFREADER A
    CTIVATED.":NEW
886 DATA 173,036,003,201,150,208
892 DATA 001,096,141,151,003,173
898 DATA 037,003,141,152,003,169
904 DATA 150,141,036,003,169,003
910 DATA 141,037,003,169,000,133
916 DATA 254,096,032,087,241,133
922 DATA 251,134,252,132,253,008
928 DATA 201,013,240,017,201,032
934 DATA 240,005,024,101,254,133
940 DATA 254,165,251,166,252,164
946 DATA 253,040,096,169,013,032
952 DATA 210,255,165,214,141,251
958 DATA 003,206,251,003,169,000
964 DATA 133,216,169,019,032,210
970 DATA 255,169,018,032,210,255
976 DATA 169,058,032,210,255,166
982 DATA 254,169,000,133,254,172
988 DATA 151,003,192,087,208,006
994 DATA 032,205,189,076,235,003
1000 DATA 032,205,221,169,032,032
1006 DATA 210,255,032,210,255,173
1012 DATA 251,003,133,214,076,173
1018 DATA 003
```

Atari Proofreader

```
100 GRAPHICS 0
110 FOR I=1536 TO 1700:READ A:POKE I
    ,A:CK=CK+A:NEXT I
120 IF CK<>19072 THEN ? "Error in DA
    TA Statements.  Check Typing.":E
    ND
130 A=USR(1536)
140 ? :? "Automatic Proofreader Now
    Activated."
```

```
150 END
1536 DATA 104,160,0,185,26,3
1542 DATA 201,69,240,7,200,200
1548 DATA 192,34,208,243,96,200
1554 DATA 169,74,153,26,3,200
1560 DATA 169,6,153,26,3,162
1566 DATA 0,189,0,228,157,74
1572 DATA 6,232,224,16,208,245
1578 DATA 169,93,141,78,6,169
1584 DATA 6,141,79,6,24,173
1590 DATA 4,228,105,1,141,95
1596 DATA 6,173,5,228,105,0
1602 DATA 141,96,6,169,0,133
1608 DATA 203,96,247,238,125,241
1614 DATA 93,6,244,241,115,241
1620 DATA 124,241,76,205,238,0
1626 DATA 0,0,0,0,32,62
1632 DATA 246,8,201,155,240,13
1638 DATA 201,32,240,7,72,24
1644 DATA 101,203,133,203,104,40
1650 DATA 96,72,152,72,138,72
1656 DATA 160,0,169,128,145,88
1662 DATA 200,192,40,208,249,165
1668 DATA 203,74,74,74,74,24
1674 DATA 105,161,160,3,145,88
1680 DATA 165,203,41,15,24,105
1686 DATA 161,200,145,88,169,0
1692 DATA 133,203,104,170,104,168
1698 DATA 104,40,96
```

IBM Proofreader

```
10 'Automatic Proofreader Version 2.00 (L
   ines 270,510,515,517,620,630 changed f
   rom V1.0)
100 DIM L$(500),LNUM(500):COLOR 0,7,7:KEY
    OFF:CLS:MAX=0:LNUM(0)=65536!
110 ON ERROR GOTO 120:KEY 15,CHR$(4)+CHR$
   (70):ON KEY(15) GOSUB 640:KEY (15) ON
   :GOTO 130
120 RESUME 130
130 DEF SEG=&H40:W=PEEK(&H4A)
140 ON ERROR GOTO 650:PRINT:PRINT"Proofre
   ader Ready."
150 LINE INPUT L$:Y=CSRLIN-INT(LEN(L$)/W)
   -1:LOCATE Y,1
160 DEF SEG=0:POKE 1050,30:POKE 1052,34:P
   OKE 1054,0:POKE 1055,79:POKE 1056,13:
   POKE 1057,28:LINE INPUT L$:DEF SEG:IF
    L$="" THEN 150
170 IF LEFT$(L$,1)=" " THEN L$=MID$(L$,2)
   :GOTO 170
180 IF VAL(LEFT$(L$,2))=0 AND MID$(L$,3,1
   )=" " THEN L$=MID$(L$,4)
190 LNUM=VAL(L$):TEXT$=MID$(L$,LEN(STR$(L
   NUM))+1)
200 IF ASC(L$)>57 THEN 260 'no line numbe
   r, therefore command
210 IF TEXT$="" THEN GOSUB 540:IF LNUM=LN
   UM(P) THEN GOSUB 560:GOTO 150 ELSE 15
   0
220 CKSUM=0:FOR I=1 TO LEN(L$):CKSUM=(CKS
   UM+ASC(MID$(L$,I))*I) AND 255:NEXT:LO
   CATE Y,1:PRINT CHR$(65+CKSUM/16)+CHR$
   (65+(CKSUM AND 15))+" "+L$
230 GOSUB 540:IF LNUM(P)=LNUM THEN L$(P)=
   TEXT$:GOTO 150 'replace line
240 GOSUB 580:GOTO 150 'insert the line
260 TEXT$="":FOR I=1 TO LEN(L$):A=ASC(MID
   $(L$,I)):TEXT$=TEXT$+CHR$(A+32*(A>96
   AND A<123)):NEXT
270 DELIMITER=INSTR(TEXT$," "):COMMAND$=T
   EXT$:ARG$="":IF DELIMITER THEN COMMAN
   D$=LEFT$(TEXT$,DELIMITER-1):ARG$=MID$
   (TEXT$,DELIMITER+1) ELSE DELIMITER=IN
   STR(TEXT$,CHR$(34)):IF DELIMITER THEN
    COMMAND$=LEFT$(TEXT$,DELIMITER-1):AR
   G$=MID$(TEXT$,DELIMITER)
280 IF COMMAND$<>"LIST" THEN 410
290 OPEN "scrn:" FOR OUTPUT AS #1
300 IF ARG$="" THEN FIRST=0:P=MAX-1:GOTO
    340
310 DELIMITER=INSTR(ARG$,"-"):IF DELIMITE
   R=0 THEN LNUM=VAL(ARG$):GOSUB 540:FIR
   ST=P:GOTO 340
320 FIRST=VAL(LEFT$(ARG$,DELIMITER)):LAST
   =VAL(MID$(ARG$,DELIMITER+1))
330 LNUM=FIRST:GOSUB 540:FIRST=P:LNUM=LAS
   T:GOSUB 540:IF P=0 THEN P=MAX-1
340 FOR X=FIRST TO P:N$=MID$(STR$(LNUM(X)
   ),2)+" "
350 IF CKFLAG=0 THEN A$="":GOTO 370
360 CKSUM=0:A$=N$+L$(X):FOR I=1 TO LEN(A$
   ):CKSUM=(CKSUM+ASC(MID$(A$,I))*I) AND
    255:NEXT:A$=CHR$(65+CKSUM/16)+CHR$(6
   5+(CKSUM AND 15))+" "
370 PRINT #1,A$+N$+L$(X)
380 IF INKEY$<>"" THEN X=P
390 NEXT :CLOSE #1:CKFLAG=0
400 GOTO 130
410 IF COMMAND$="LLIST" THEN OPEN "lpt1:"
    FOR OUTPUT AS #1:GOTO 300
420 IF COMMAND$="CHECK" THEN CKFLAG=1:GOT
   O 290
430 IF COMMAND$<>"SAVE" THEN 450
440 GOSUB 600:OPEN ARG$ FOR OUTPUT AS #1:
   ARG$="":GOTO 300
450 IF COMMAND$<>"LOAD" THEN 490
460 GOSUB 600:OPEN ARG$ FOR INPUT AS #1:M
   AX=0:P=0
470 WHILE NOT EOF(1):LINE INPUT #1,L$:LNU
   M(P)=VAL(L$):L$(P)=MID$(L$,LEN(STR$(V
   AL(L$)))+1):P=P+1:WEND
480 MAX=P:CLOSE #1:GOTO 130
490 IF COMMAND$="NEW" THEN INPUT "Erase p
   rogram - Are you sure";L$:IF LEFT$(L$
   ,1)="y" OR LEFT$(L$,1)="Y" THEN MAX=0
   :GOTO 130:ELSE 130
500 IF COMMAND$="BASIC" THEN COLOR 7,0,0:
   ON ERROR GOTO 0:CLS:END
510 IF COMMAND$<>"FILES" THEN 520
515 IF ARG$="" THEN ARG$="A:" ELSE SEL=1:
   GOSUB 600
517 FILES ARG$:GOTO 130
520 PRINT"Syntax error":GOTO 130
540 P=0:WHILE LNUM>LNUM(P) AND P<MAX:P=P+
   1:WEND:RETURN
560 MAX=MAX-1:FOR X=P TO MAX:LNUM(X)=LNUM
   (X+1):L$(X)=L$(X+1):NEXT:RETURN
580 MAX=MAX+1:FOR X=MAX TO P+1 STEP -1:LN
   UM(X)=LNUM(X-1):L$(X)=L$(X-1):NEXT:L$
   (P)=TEXT$:LNUM(P)=LNUM:RETURN
600 IF LEFT$(ARG$,1)<>CHR$(34) THEN 520 E
   LSE ARG$=MID$(ARG$,2)
610 IF RIGHT$(ARG$,1)=CHR$(34) THEN ARG$=
   LEFT$(ARG$,LEN(ARG$)-1)
620 IF SEL=0 AND INSTR(ARG$,".")=0 THEN A
   RG$=ARG$+".BAS"
630 SEL=0:RETURN
640 CLOSE #1:CKFLAG=0:PRINT"Stopped.":RET
   URN 150
650 PRINT "Error #";ERR:RESUME 150
```

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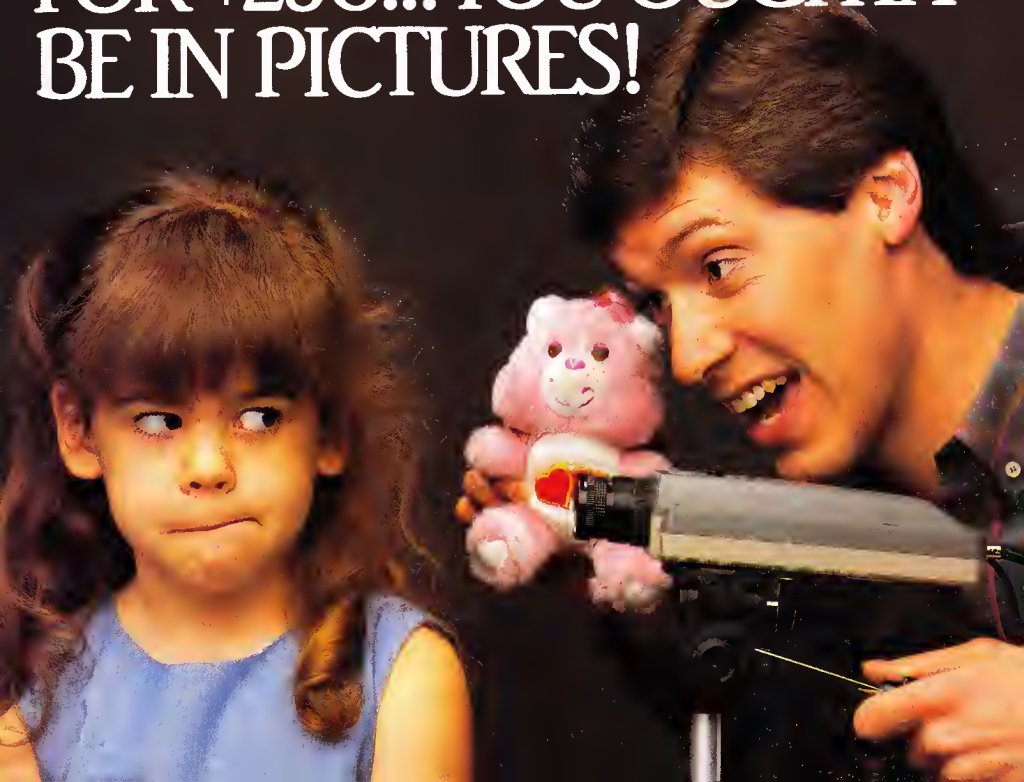

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